DOMESTIC HYGIENE

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THOMAS DUTTON, M.D.

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DOMESTIC HYGIENE.

BY

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PREFACE.

The various articles included in Domestic Hygiene have been written for special Journals, most of them for that very useful domestic paper "*The Table.*" I have thoroughly gone over them again in order to rectify any mistakes, and add more useful matter, some of which had escaped my notice, and I have to thank an eminent sanitary expert, who has taken great interest in these articles, for pointing out the deficiencies. I claim for the work no especial merit as a scientific manual, only that I have endeavoured to reduce all technicalities to understandable English in order that every educated person may be able to read it, and apply the rudiments of hygiene in a practical form to their household.

I honestly believe if people would only follow up the advice given in the several articles they would not only keep disease away from their door and thereby save themselves no end of worry, misery and expense, but would be the means of minimising the labours of the various sanitary authorities and enabling them to administer for the benefit of the community at large those admirable laws and regulations contained in the Public Health Act of 1891.

I have to thank Dr. C. Maybury D.Sc. (Lond.) D.P.H. (Dub.) for kindly looking over the articles for me.

THOMAS DUTTON.

Craven House,
Northumberland Avenue,
London,
April, 1894.

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INTRODUCTORY ARTICLE.

The importance of a sound, even though it be but a slight, knowledge of domestic hygiene is absolutely essential if we wish to ward off disease and death, for we possess no more powerful instrument with which to contend against the former than hygiene; so strong and true in defence is this instrument that some of the most loathsome diseases have almost been entirely eradicated by its aid. True, the well fed and nourished can often for a long time live amid defective hygienic surroundings, while the half starved, the debilitated and weak speedily become victims; but the hour of reckoning is sure, however slowly, to come to the former class, and a healthy constitution soon becomes undermined, and all the care and time which may have been devoted to the study of diet are entirely wasted through this carelessness respecting the laws of higiene. It is not sufficient to merely ask ourselves, "*What shall we eat, and what shall we drink?*" but we must go further, and put the additional questions, "*Is the house in which we live sanitary?*" "*Has it a proper water supply?*" and "*Is the ventilation sufficient?*"

I hope to be able to show in the following articles that nothing returns so large a percentage in the way of health, strength and happiness, than a close study of hygienic principles; and that the people who, in addition to studying them, put them into practical use, may see sorrow, disease and death constantly coming into their neighbours' houses and invariably passing theirs by.

I have many a time during my professional career seen an only child, who was the sole hope and joy of its parents, snatched away in a few hours by that dire disease, diphtheria, and the parents cast down with a sorrow almost unsupportable,—and which can only be fully known by those who have gone through a similar ordeal. Frequently, the most calamitous part of such cases is that a little foresight and ordinary attention to sanitation would have prevented the sad catastrophe. We often have to deal with the older members of the community who look upon hygiene as a new fangled idea of the modern school of medicine, and to whom the old proverb respecting "*the shutting of the stable door after the steed has gone*," very frequently applies. As an illustration of this, I may mention the case of a near relative of my own who, having been informed by me on one occasion that there was sewer gas in the house, pooh-poohed the information, and affected to look upon the warning as the offspring of an embryonic or immature medical brain; and it was not until nearly all his children had been ill, and he himself had almost lost his life through a carbuncle, that he believed my statement to be correct.—The house was then thoroughly examined, and a large leak in one of the sewer pipes running through the house was traced by the aid of oil of peppermint, which simple operation, if carried out at the first, would, there is not the least doubt, have saved no end of trouble, anxiety, and expense. I think I have shown that *hygienic economy*, from whatever view we may regard it, is, if we are desirous of passing through this world with a minimum amount of friction and trouble, one of the most profitable studies.

I must confess I think it is something for the medical profession to be greatly proud of, that they were the first pioneers of sanitary science, for if it had not been for their constantly worrying the authorities, many of the useful Acts relative to the enforcing of sanitary laws would not have found their way on to the Statute books. I might further add that a very legitimate reason for their pride may be found in the fact that all their efforts in the cause of sanitation and hygiene have been entirely against their own pecuniary interests; and when we find in the present day so very few men willing to advocate a thing likely to be detrimental to their own interests, or in any way touching their pockets, I may, I think, be fairly excused for pointing out to my readers this noteworthy fact, that the profession without giving the monetary question a moment's consideration, have ever been first in the field in the extirpation of disease, and by offering the authorities all their intellectual knowledge on the subject, have most materially assisted in the advancement of this much-desired result. I trust this extremely healthy example may continue to find favour among the coming generation of *medicos*, for, although sometimes we get very little thanks for our fervour, the public, I am sure, will at least give us credit for being disinterested advocates.

I shall endeavour to make this work as practical as possible, and to use as few technical terms as may be consistent with the subject treated upon, and propose to go so far only into the subject of hygiene as may be thoroughly sufficient to instruct and inform all who have a household to conduct and look after.

The subjects I propose writing upon are those of Air, Ventilation, Warmth, Water, Sanitation, Architecture, Clothes, Furniture, Fevers, Nursing, and such other subjects as are fairly within the province of *Domestic Hygiene*. In dealing with these subjects I shall try and explain some easy methods by means of which we can detect impurities, such as carbonic acid gas in the air, organic contaminations, lead in water, etc., etc., and by so doing make, I trust, this book of practical utility to every householder.

There are numerous works published on the subject, but, unfortunately, they do not meet the want so long felt for a book easy to read and understand, for most, if not all of them, err in giving too much information and making the subject too technical and incomprehensible except to a student who has undergone a scientific training. I find this same fault occurring in other professional branches where I (being the untrained student) have been anxious to increase my store of knowledge. On buying a book, which from its title I should have judged was exactly the book from which to gather the elementary part of the subject I was desirous of getting up, I have found, on reading a few pages, that it was so full of technicalities that to gain any knowledge from it a dictionary would be an essential companion to the book, and the work, therefore, so far as I was concerned, practically useless.

The Public Health (London) Act, 1891, should be a great boon to every householder who looks after the health of those under his care. A copy of the Act should be obtained and duly studied, for it will be found that a knowledge of its sections will often save a considerable expense of time, worry, and anxiety. There is a very handy work on the Act by A. Constable

Manbury, D. Sc. (London, published by Henry Kimpton, 82, High Holborn, W.C.), which, in addition to a very lucid dissertation on the Act, contains an "Epitome and Copious Index," thus rendering the Act very easy of reference.

Sections 29 and 30, of the Act referred to, make very clear the liability of the authorities with regard to the removal of refuse, which for so long a time has been a thorn in every household, and which during the summer months is often a rendezvous for all wandering microbes, and, in consequence, becomes a most dangerous infecting medium of various diseases.

By Section 29 the Sanitary Authority must now keep the streets of their district, including the footways, properly swept and cleansed so far as is reasonably practicable, and also remove street refuse. The same general regulations apply to the removal of house refuse. A defaulting Sanitary Authority in either case is liable to a penalty not exceeding twenty pounds.

By Section 30 if any person in the employ of the Sanitary Authority, or any contractor with the Sanitary Authority, demands from an occupier, or his servant, any fee or gratuity for removing any house refuse from any premises, he shall be liable to a fine not exceeding twenty shillings. From the above sections it will be seen that people now need only apply to have the Act enforced, if the Authority does not promptly remove the refuse.

CHAPTER I.

AIR, ATMOSPHERIC.

First among the essential hygienic conditions comes *pure air*, for to it we owe our very existence; and from the moment we come into the world, until what we call life leaves the body, it is air that keeps the wonderful machinery of the body going, for if deprived of this essential material it would stop in a very few minutes—in short, air is to the human body what steam is to the steam engine.

We often speak of drowning as if the water kills the victim, whereas death is due to the want of air (*asphyxia*), the water being merely the obstacle which prevents the air from entering the lungs; and if we had lungs made on the same principle as those of fishes, we could live as well in water as on land. Anything, therefore, which prevents a free supply of air from entering our lungs is dangerous and injurious to our health.

To keep the body in a healthy condition it is not only necessary that the supply of air should be abundant, but it must also be *pure*, *i.e.*, of a certain chemical composition, which was found by Lavoisier to consist of oxygen and nitrogen gas, and, when pure, to be colourless, tasteless, and inodorous. Air is 770 times lighter than water. In towns and places where a number of human beings and animals are congregated, the air is never quite pure, and, in addition to oxygen and nitrogen, contains all or some of the following, viz., carbonic acid (CO_2) ammonia, nitric acid, marsh gas (CH_4) sulphuretted hydrogen(H_2S), ozone, moisture, and organic matter; so, properly speaking, it is a mechanical mixture not a chemical compound.

Such impurities as carbonic acid, ammonia, marsh gas, sulphuretted hydrogen, and organic matter, when in excess of a mere trace, are sure to be prejudicial to robust health; and we can easily understand the reason why a sea voyage sometimes produces such marvellous results in people who have been living in a tainted atmosphere, for sea air is nearly absolutely pure, and is most exhilarating on account of the presence of ozone (condensed oxygen). The same purity can be obtained on the tops of mountains and in places far away from towns and manufactories, if there is a complete absence of decaying vegetable matter.

The process of what we call breathing is performed as follows:—The air is alternately drawn into and expelled from the lungs by the two successive movements of *inspiration* and *expiration*, the former drawing in a volume of air and the latter expelling it; the amount of air daily required being about 1,000,000 *cubic inches*. During the time the air has remained in the lungs the organs have not remained idle, but have altered the temperature, the moisture, and chemical composition; the temperature is raised to nearly blood heat, the moisture much increased. In the chemical composition we find that five out of twenty-one volumes of oxygen are abstracted, and four volumes of carbonic acid added, besides nitrogen and various excretory principles.

From the above it will be easily understood that if several persons are in a room insufficiently ventilated, breathing the same air, the oxygen soon gets exhausted, and carbonic acid takes its place, with the natural consequence that every one in the room soon becomes fatigued and faint. Matters are made much worse when, in addition to the amount of oxygen used by the people in the room, three or four gas jets are consuming large quantities of it as well, and still tainting the air with a further supply of carbonic acid—a product of combustion. It is to oxygen—the active element in the air—that we owe our life and health, and it is, therefore, of the utmost importance that we should always have a free supply of it. The best means of ensuring this is to have the air always in motion,—Nature provides for this movement by the aid of wind, and we must make a like provision by means of ventilation in rooms, churches, and other places where large assemblies of people gather together. The subject of ventilation I shall, however, leave for the present, as I propose dealing with it very fully later on.

The effects of overcrowding and breathing impure air are twofold. First, the absorption of oxygen and the elimination of carbonic acid diminish considerably and morbid symptoms begin to appear; and when the air contains 10 per cent of carbonic acid (in which case it has lost about half its normal proportion of oxygen), it becomes totally irrespirable, and is at once fatal to man. No better nor more terrible illustration of this can be furnished than the awful *Black Hole of Calcutta* where, as doubtless the reader will remember, in a room 18 feet square, and having but two small windows, 146 women and children were confined for one night, with the result that only twenty-three were alive the next morning. The second effect is the imperfect oxidation, elimination, and destruction of waste products of the body (such as the poison of urea), and the accumulation in the body of the effete organic substances which are produced by the wear and tear of the system and by alimentation. Besides these consequences there is a depressing influence and general *malaise* of the system generally, making it peculiarly susceptible to the various zymotic diseases. Another very valuable power oxygen possesses, is its chemical affinity for other gases, and this property makes it act as a powerful disinfectant to animal and decaying vegetable matter by oxidising them.

Dr. Angus Smith found one grain of animal matter in 8,000 cubic inches in Manchester, and on the hills above, where oxygen was in greater abundance, only one grain in 200,000 cubic inches.

Some readers will wonder how it is that, as so many millions of human beings and animals in a large town are continuously depriving the atmosphere of its oxygen, in course of time it does not get exhausted. Nature has provided for this enormous consumption by making plants the compensating medium; for both terrestrial and aquatic plants have the power, in the presence of sunlight, of removing from the atmosphere carbonic acid and replacing it by oxygen. This is done by their retaining the carbon and giving back the oxygen; but in the absence of sunlight plants take up oxygen and evolve carbonic acid like animals, and the parts of the plants coloured other than by chlorophyll, as petals and sepals, are constantly giving off gas. Care should therefore be taken not to have any large number of plants in sleeping apartments.

From the above statements the reader will, I think, readily apprehend that both plants and animals are necessary to keep the air of average composition; and if the plant life on the globe increases relatively as regards animal life, the air would be deprived of this ingredient of carbonic acid, and, on the other hand, if the vegetable kingdom were not able to remove the carbonic acid evolved by animals, the latter would sooner or later become asphyxiated.

The following simple tests will enable the reader to detect impurities, or determine the presence of ozone, moisture or heat.

Germs.—To purify air from germs, pass it through red-hot tubes and so destroy them; if to intercept them, pass the air through cotton wool.

Carbonic Acid.—Through a wash-bottle of lime or baryta water draw some of the air to be tested, if carbonic acid is present it will become milky; the more milky it becomes the greater the quantity of carbonic acid.

Organic Impurities.—Place a few grains of permanganate of potash in a bottle containing distilled water; draw some of the air through it by means of two tubes and an india-rubber bag. (A bottle made for such purposes can be bought of any chemist). Any organic matter will at once turn the port-wine-coloured liquid *brown*, the browner the colour the greater the amount of organic impurities.

Germs and other particles.—Draw air through an aspirator, and place muslin moistened with glycerine in the aspirator. The glycerine, etc., should be carefully conveyed to a slide and examined under the microscope.

Ozone.—Moisten a piece of red litmus paper with a solution of iodide of potassium, and leave it exposed to the air; if ozone is present it will become *blue*.

Moisture is measured and ascertained by an instrument called a *Hygrometer*. Some people use a piece of sea-weed by way of substitute.

Heat and Cold.—By an instrument called a *Thermometer*.

In performing all chemical experiments, care should be taken that the tests are pure, and *distilled* water only used; for if ordinary water is used it may contain the impurity we are looking for.

CHAPTER II.

VENTILATION.

In the previous chapter on "Air," I have clearly laid down that it is essential, if we wish to keep air pure, to have it in constant motion, and to remove the contaminated air and replace it with *fresh* air, as it is popularly called. The only way to accomplish this in dwelling houses or large buildings is by means of efficient ventilation. The study of how to thoroughly ventilate houses, public buildings, and drains has received considerable attention of late years, with the result that that very useful scientific gentleman, the practical sanitary engineer, has been enabled to surmount nearly every difficulty, and invent machines and apparatuses which will ventilate almost any place. I was much struck with the ingenuity and utility of these machines when inspecting a number of them at the last Brewer's Exhibition. I have often thought, when panting for breath in a badly ventilated church, what a very desirable, and at the same time sensible thing it would be to have a ventilator fixed in it, for I am certain that no amount of fervour of devotion will enable a worshipper to listen with any attention to a discourse, however powerful it may be, when the predominant sensation with him the whole time is a feeling of intense oppression and faintness.

It is almost impossible to ventilate the majority of old houses, with their large heavy rooms, small windows, and dark staircases, without any skylight in the roof. From the stuffy, mousey smell, generally prevalent, it is sufficiently evident that the air is only renewed at long intervals. These houses, I need scarcely say, cannot be healthy to live in. The newer houses are much more easily ventilated (perhaps I ought to say the greater number of them), and with large lofty rooms well lighted with bow windows, the stairs also well lighted by windows at certain intervals, and a skylight opening on to the roof, have all the essentials to promote a strong current of air which prevents stagnation. We must, however, very carefully distinguish *ventilation* from *draught*, for the latter brings in its wake untold miseries in the shape of neuralgias, rheumatism, etc. In true ventilation there should be no draught at all; the replacing foul air with fresh air should take place without any appreciable movements to the senses. A door, window, and fireplace (when a fire is burning) form a crude ventilator but the ventilation principally consists of a cold draught of air coming in two directions and going up the chimney, such part of it as comes from under the door chilling in its progress the feet and lower part of the legs. What is required is to have the door and window fitted tightly or made tight by india-rubber, and then to have placed in the top and bottom panes of the window a ventilating pane, which can be regulated to admit air in large or small quantities according to the season of the year.[1] It is also always well to have a valved ventilator placed about four feet above the mantelpiece; particularly if the room is used as a smoking-room. The rationale of this system being that the hot polluted air gradually rises from the floor to the ceiling and is caught by the top pane ventilator and passes out (by the principle termed *extraction*), whilst a current of fresh air rushes in at the bottom pane ventilator to fill up the vacuum (by the principle termed *propulsion*), and at the same time heated fresh air is coming in through the chimney ventilator.[2]

The hall should also have a ventilating

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[1] If there are two windows in a room, placed opposite one another, this makes a perfect system of ventilation in all weathers.

[2] To make chimneys better ventilators and to prevent them from smoking they should be placed on the warm side of the house.

pane placed above the front door, and the same form of ventilation should be adopted in respect of the windows up the staircase and in every room. To make this system perfect all doors and windows should fit tightly, and the blinds should be made so as not to cover the ventilators. The skylight takes a very important part in the complete ventilation of a house, and has much to do with making it healthy. It should be of glass, capable of being easily opened and shut, and have ventilating panes, so that in cold weather the whole of the skylight need not be opened. By these means all the foul air and smells from the kitchen[1] are carried away, and their places taken by fresh air from the ventilating panes over the street door and in the staircase windows.

I must not forget to refer to the *lavatories*. These places are, as a rule, very badly ventilated, for there is generally either a cold draught, which is very trying to the invalid and weak coming out of a warm room, or the place is stuffy and often polluted with sewer gas. The place should have continuous ventilation, not spasmodic such as opening a large window occasionally. To accomplish this, holes should be bored at the top of the door, and a ventilating pipe run up by the side of the window and passed through the wall into the open air about two feet from the ceiling, the mouth of which should be provided with a cowl. All the drains should also have a ventilating shaft let into the pipes and carried to the top of the house, and protected by a cowl; by so doing most of the sewer gas is carried away from the house, and the small quantity that may find an inlet is well diluted with pure air (which, as I have already told the reader, is a powerful disinfectant) and so rendered harmless. I am afraid that many of my readers will think that the system of ventilation I am recommending is somewhat elaborate and extensive in character and would involve a certain amount of expense; but I would ask them to bear in mind the very important fact that the only expense is the first expense and that, as against that, they will, by this perfected system, have ensured all the essentials, as far as pure air is concerned, for perfect health, and will, in consequence, be spared the heavy doctor's bills which ill-health so quickly runs up.

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[1] From a sanitary point of view it is better to have the kitchen situated at the top of the house.

Mines are ventilated by the principle of extraction. By means of a furnace at the bottom of the shaft the foul air is constantly coming up, and fresh air is drawn down another shaft and made to traverse the whole mine by an arrangement of partitions and double doors.

The chief points to bear in mind in ventilation are that we must have an *inlet* for fresh air, and an *outlet* for foul air. The former should be placed near the floor, the latter near the ceiling. If the means employed be a tube let into the bricks, this should slope downwards, to prevent the entrance of rain, and have a sliding cover easily adjustable in the same way as a ventilating pane is. This is very important, for if we cannot regulate the amount of air that comes in at different seasons of the year, we run the danger of having at times a rush of cold air which would have the double effect of lowering the temperature of the room and creating a draught.

In very hot weather of course the artificial means of ventilation may be abandoned and the windows thrown wide open and as much fresh air admitted as possible; but this plan cannot be adopted in England for much more than two months in the year.

There are stoves manufactured which not only throw out heat into the room but act also as fresh air ventilators warming the air as it passes through them. I have a gas-stove myself, where the fresh air is warmed during its passage through the coil and enters the room at a moderate temperature; but concerning warmth I shall have something to say in the next chapter.

In conclusion I would point out that there should be *cubic space* sufficient to permit the passage of about 3,000 cubic feet of air per head every hour, without producing perceptible draughts. If the cubic space per head is small, the renewal of air will necessarily have to be much more frequent than when it is large; for example, if the space is only 100 cubic feet, the air must be renewed thirty times per hour, in order that the regular amount be supplied, and with this constant renewal a certain amount of draught must be experienced. I think everyone should at least have 600 cubic feet of space to ensure health.

CHAPTER III.

WARMTH.

It is an indisputable fact that as many chills and colds are caught inside the house as outside, and this is due to the extraordinary practice we have of warming the sitting-rooms up to a very high temperature, and very seldom, if ever, warming the sleeping apartments, hall, or lavatories. The very natural result follows that anyone being in a warm room for some time and then going through the hall to a cold bed-room, frequently takes a chill which may lead to a serious illness. I have constantly noticed a want of appreciation of the importance of this subject among all classes and conditions of people.

In old houses, with their large gaping

grates ready to consume any amount of fuel and giving off the heat a few feet up the chimney instead of in the room, it was nearly impossible to keep a room at an equable temperature; but in modern houses with the latest inventions in grates, stoves, etc., it is not hard to accomplish this very necessary feat which brings comfort as well as health to all.

It is well to remember that copper transmits heat four times better than iron, all metals conduct heat better than stone, stone than wood, wood than woollen material. The best stove to use is a slow combustion stove, placed as near the floor as possible, and coming well out into the room; the receptacle for the fuel should be lined with fire-clay blocks, and be large enough to contain fuel for six hours' consumption. The fire should he lighted from beneath and the grate filled with fuel, and when the temperature of the room has reached 60° to 65° it should be fed with only just sufficient fuel to keep up that temperature. As I mentioned in the chapter on air, we have had recently invented what is called a *pyro-pneumatic grate.* In this the fuel is burned in an open grate, surrounded by fire lumps which impart their heat to the fresh air entering beneath.

Stoves should be placed in the middle of the room in order that the heat transmitted should be conducted to the surrounding air. They should have slanting jambs in order to throw forward a large radiating surface. If gas is used the flame should be a short blue one emitting but little light, which shows that the carbonic oxide is being consumed by complete combustion, for when the flame is long, yellow, and bright it forms soot and gives out but little heat. Gas-stoves are clean, cheap, and easily managed with a little care; the prejudice against them either for heating or cooking is entirely due to their being badly ventilated, a fault that has now been remedied, as most of the stoves now in use are perfectly odourless, and do not impart any peculiar taste or flavour to articles of food cooked upon them.

Besides coal we can use for warming purposes gas, oil, hot water, steam, hot air, or electricity. These are all very useful in their way, particularly for heating large public buildings, but they require great care in regulating the heat, and also plenty of ventilation, otherwise the warmth produced is unsatisfactory, and is accompanied by all kinds of disagreeable odours.

For private dwellings I do not consider there is any more wholesome way of warming the air than by means of the *black diamond*, when placed in a proper receptacle; next to it come gas and oil, and doubtless, before long, we shall be able to add electricity. There are some extremely ingenious portable stoves constructed to burn gas and oil in, and which, if carefully handled, emit no smell, and the waste products are effectually carried up the chimney, or consumed by the stove itself. These stoves are most useful for warming bedrooms, halls, and lavatories at a very small cost with efficiency. I myself have a small paraffine-stove which only smells when I do not attend to it myself, and which will in an hour warm my bedroom fifteen to twenty degrees for the very slight cost of a penny.

We should always have a thermometer to guide us as to the heat of any place, as it is impossible to guess correctly by our feelings. I look upon 60° to 65° Fahr. as a pleasant and healthy temperature; if it is much above 65°, a feeling of oppression ensues, and if much below, a feeling of chilliness. People who live in close, heated rooms are sure to suffer from general *malaise*, a slightly coated tongue, nasty taste in the mouth, and headache.

Some architects maintain that in a well-constructed house, or public building, the warm air should be supplied from the hall after Mr. Ritchie's plan, which is to heat air to about 70° Fahr., and let it enter the various rooms through longitudinal openings over each door. After being diffused all over the rooms, it then passes up the chimneys and through flues reaching from the ceiling to the wall heads under the roof. This is rather a complicated and expensive method to introduce into a house already built, although neither complicated nor expensive if carried out when the house is in the course of construction. Vide the discription of Smead's system.

I shall have much to say, when writing on Sanitation, about the great care that should be exercised when choosing houses, but I may here advise anyone who is about taking a house, to go thoroughly into the subject of ventilation. Landlords will often do what is required if the tenant insists upon the same before signing the *legal instrument*, but after that is done all sanitary improvements must come out of the tenant's pocket. I do not in these articles propose to go too deeply into the medical aspect of ventilation, but I can assure the reader that a physican's case book could reveal some remarkable cures solely due to efficient ventilation being recommended and carried out.

Before leaving the subject of warmth, I

must say a few words upon *domestic luminants*, for these have an important effect upon the air in a room. Perhaps if the writing of this chapter was deferred for a few years, these remarks would not be necessary, for in all probability the only luminant then will be the electric light, which possesses the twofold advantage of not requiring for combustion the vital element—oxygen, and, for the comfort of everyone, and I might add to the advantage of everything, does not produce particles of carbon which carry so much injury in their wake. People have many different opinions as to the domestic comfort of the light, but all must agree that from a sanitary point of view no other means of lighting can in any way approach it.

At present most people use either gas, oil, or candles, all of which require a certain amount of oxygen to keep them alight and this they replace with carbon. For example, a gas-jet burning one cubic foot of coal gas, consumes eight cubic feet of oxygen and replaces it by two cubic feet of carbonic acid, besides other impurities varying more or less in quantity according to the care bestowed on the manufacture of the gas. As a jet burns about three feet of gas per hour, the importance of having these deleterious products of combustion carried away by special ventilating channels will be readily admitted. The same remarks are applicable to oil and candles, but in a lesser degree, as their power of consumption is not so great. That a large amount of carbon is scattered in the air is demonstrated by holding a piece of white porcelain over a candle or lamp for a few seconds.

All will admit that it is very injurious to burn gas in a room, and then breathe the products. These products, although we do not see them, are floating in the air to the extent of 5,000,000 to 8,000,000 particles to the cubic inch. The objections to the noxious products thrown off could, however, be easily obviated by fixing the burner in the wall or ceiling and having properly constructed ventilating outlets, the Gas Companies at the same time performing their share of the work by supplying purified gas. I believe that taking into consideration all the advantages gas possesses as a domestic source of light, the Gas Companies, if they bestirred themselves, and gave every facility to householders to adjust the gas-burners so that combustion would not take place in the room, and, in addition, supplied gas purified from all harmful products, would easily compete with the electric light, notwithstanding the many advantages which the latter, as I have already pointed out, possesses.

I will bring this chapter to a close by reminding mothers how necessary it is for growing children that the temperature of the night and day nurseries should be carefully studied, and not left to the judgment of some young girl acting in the capacity of a nurse. She cannot be expected to have the wisdom of a trained person or mother, and the consequence is the day nursery in the winter months, particularly on wet days, is so over-heated as to become injurious to the children's health. I have frequently noticed the absence of a thermometer in the room. I do not see how the nurse can keep the room at a healthy temperature without such a useful instrument, which should be always hung on the opposite wall to the fireplace, and kept at a point between 60° and 70°, at which temperature the room will feel pleasantly warm.

Although I have treated the subject of Warming and Ventilation separately, there is not the slightest doubt that a combination of the two is most scientific, for it produces the maximum amount of comfort and on the best hygienic principles. Unfortunately our large public buildings, Hotels, Schools, etc., cannot have this combination added to them after the buildings are completed, without a large extra expenditure, but when the System which I am about to describe, is fitted during the construction of a building, the extra cost is very small, whereas its efficiency is now a matter of history.

In the United States where both private and public buildings are being built as rapidly as the extraordinary progress of that interesting country demands, warming and ventilation are so widely adopted that those who have had the opportunity of visiting the States, must wonder why we in this country are so far behind.

The System adopted in about one-third to one-half of the Public Schools of the States and Canada is on the Aspiration method, known as the "Smead Warm Air System," as distinguished from the Hot Water and Steam Heating methods.

The Smead System is planned and carried out upon truly scientific principles, *i.e.*, a large delivery of fresh air, a large radiating surface so placed as to warm but not superheat the air, as has heretofore been the practice in this country, and which has caused the only correct system—indirect radiation—to fall into disuse, and the pernicious method of simply warming and rewarming the same old air by the use of steam and hot water pipes or coils in the room itself.

I will not go too technically into the scientific construction of this System, but will for the benefit of the reader explain it in a few plain words.

In the United States it is usual to provide, in the construction of a building, a basement under the entire building, and as much of it is given to the Heating Engineer as may be required.

TheAirWarmers are placed where needed, and properly encased in brickwork. Each Air Warmer is fixed in a fresh air chamber. The fresh air enters this chamber from outside, passes over the surface of the Air Warmer where it takes up the requisite amount of heat units, and by the well-known law which I have already described in previous articles, known as diffusion of gases, the heated air expands and rises through large vertical flues to the rooms above. These vertical flues serve the twofold purpose of admitting cool air as well as warm air. This is accomplished by the aid of a valve placed in the flue between the cold and warm air openings, the action of which we will describe further on.

In the Smead System large quantities of air are thus passed through buildings without the aid of machinery. In this country, however, where the buildings are so close together and fresh air is at a premium, we must have some other contrivance to draw in, filter, and purify the air before it enters the fresh air room. The well-known Blackman Fan, the property of the Blackman Ventilating Co., does this admirably. For very large buildings, or those in which only a small part of the basement can be used for the heating apparatus, the Blackman-Smead System is used, which differs from the "Smead" in the important point that it is mechanical, as against a system of simple aspiration. In small buildings the Air Warmer is used for warming the air passed through it by the Blackman Fan. In large buildings, or those covering a large superficial area, steam is often used as the heating medium, for the reason that it is necessary to have some supplementary heating in the long horizontal ducts, often far away from the source of heat, that the air may be maintained at the same degree of temperature throughout, which cannot always be accomplished from a central heating chamber.

The Blackman-Smead System can be carried out on the Single Duct or on Bartlett's Patent Double Duct method, a description of which may be of interest.

In the basement is placed the Air Warmer or Steam Coils, Engine, Blackman Fans, Wet Screen, and Air Ducts. The "Blackman" pulls air from outside into the fresh air room, thence through the Wet Screen, which will intercept the soot or dust that may be in the air; the air then passes over the heating apparatus, and is forced through the building.

The Blackman-Smead System of Warming and Ventilating by the Double Duct method, is one in which one horizontal duct is placed above another. At the entrance to each duct a "Blackman" is placed, which forces cold air into the lower duct, and warm air into the upper one. From the sides of these horizontal ducts flues are carried up to each room in the building. At the bottom of each flue is an opening into the cold air duct, by which cold air can enter the flue; above this is another opening, which admits warm air to the flue. Between the two openings a valve is hung in a frame, the valve is controlled by a chain from the room above. When the valve is down, warm air only is allowed to pass up the flue into the room. If the room becomes too warm the valve can be raised, which will allow cold air to enter the flue and mix with the warmer air, thus reducing the temperature of the admitted air, but without restricting its volume.

By this means continuous ventilation is assured at whatever temperature may be desired, regardless of the pre-occupation of the attendant. In many buildings it is desirable, and often necessary, that different rooms should have different temperatures. When this double duct method is used, the temperature of each room is under the control of the occupant.

By the single duct method the air, after passing over the heating apparatus, enters a mixing chamber, and is then forced through horizontal ducts to the vertical flues that lead to the rooms above.

Where the Blackman-Smead System is used, either by the single or the double duct method, any amount of fresh air can be delivered into the rooms up to 3,000 cubic feet of air per minute to each occupant.

The cooler and vitiated air of each apartment is drawn off near the floor line, through flues arranged for that purpose, and exhausted into the outer air.

It does not require any further words from me to show that this must be the most sanitary method of warming and ventilating buildings of all kinds, particularly Hospitals.

The advantages may be summed up as follows:—

a. The temperature of a building can be raised in from one to two hours to the desired degree, which is easily and cheaply maintained.

b. The avoidance of objectionable draughts.

c. The Warming and Ventilation being inseparably connected, go together.

d. The cost is moderate when the System is constructed during the erection of the buildings.

e. Uniformity of temperature throughout the building.

f. The risks run in going into rooms and corridors of different temperatures are avoided, and many valuable lives and long doctor's bills are saved.

CHAPTER IV.

WATER—DOMESTIC SUPPLY.

It is most essential for health and comfort to have an abundant supply of water, and only those who have been travelling in places where it is conspicuous by its absence can realise its almost priceless value. In large towns in England the domestic supply is mostly in the hands of water companies, and the quantity is practically unlimited: but in the country the inhabitants have still to trust to the well-supply which, if the well is properly situated and away from all contamination, cannot be improved upon for quality and quantity. The supply of pure well-water greatly depends on the underlying strata and upon the sea-level of the proposed site. For instance a well sunk in superficial sand, gravel, or chalk surface beds is very liable to dry up in seasons of great drought; but a well sunk in red sandstone or oolite usually yields a large and constant supply which is not likely to get contaminated. The dangers of well-water are, however, numerous, particularly if the well is not an *artesian* one. I will mention the most common of these dangers:—

a. The brickwork of the well may get loose, and the bodies of dead rats are frequently found in the water.

b. All manner of things may get thrown down.

c. A solution of sewage may get into the well by means of some fissure or opening.

The last danger is of frequent occurrence, and has become more so of late years, by reason of the great increase in population, and the general custom of using artificial manure of a most penetrating odour and foul composition.

In modern built houses there is generally a continuous supply of water. This is a very distinct improvement on the old custom of storing it until required in a cistern; for, unless the cistern is emptied daily, its contents run the risk of all kinds of contamination, and the fresh supply is mixed with the stale. There is also, if a cistern is used, the trouble and expense of cleaning it out and this we must necessarily do if we wish to keep it sweet. I have fully dealt with river water and its impurities in my book "*Food and Drink*," when writing on the subject of "*Non-Alcoholic Drinks*."

I know no better plan, if a constant supply is laid on to a house, of keeping water pure than to fix a silicated carbon filter to the supply pipe. These filters are made by *The Silicated Carbon Filter Co.*, and possess the great advantage of being easily cleaned out and inspected, and are, in addition, self-aërating. I have carefully tested them, and found them very efficient and to be thoroughly depended upon. It is certainly a pleasant feeling to know that the water we use for drinking, or for the domestic purposes of ablution, washing utensils, or cooking is pure.

People living in towns know little about rain-water, which is stored up so carefully by the peasant in the country.[1] It is highly aërated and perfectly pure, except when collected in a thickly populated country, when we may find organic impurities, such as dust and carbon, in it. Rain water is very soft, and on this account mixes well with soap, and is highly prized by the washer-woman in consequence, for clothes washed in it come out a beautiful white colour. It is also the best water to use for cooking purposes.

The amount of water required daily for

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[1] Of the rain that falls on any surface, part is absorbed, the proportion being dependent on the character of the soil (sand, 90 per cent; clay, 40 per cent; sandstone, 23 per cent); the other part is evaporated.

each individual for all purposes is from thirty to forty gallons. If this amount is allowed there should be no difficulty with the aid of soda and soap in keeping the whole of the house clean and sweet. Very often people of the lower classes, availing themselves of the properties which water, soda, and soap possess of absorbing dirt, keep their houses far more sanitary than the wealthy, who cover their floors up with thick carpets which collect all manner of dirt, and the boards beneath, in consequence, only get a taste of water during the spring cleaning.

The water supply of big towns is becoming a very vexed question, but there cannot be a shadow of doubt, having regard to the important bearing it has on the health of the community, that the control of the supply should pass out of the hands of the trading companies into those of the County or Municipal Councils, which could expend the whole of the profits in improving the supply both as regards quantity and quality. Considering the enormous profits the Water Companies make out of this commodity, there would be, I should say, very little difficulty not only in providing a constant supply for every possible purpose, but also in employing a staff of qualified chemists, whose duties should be to regularly test the supply for impurities; by which means an epidemic of cholera or typhoid fever might frequently be nipped in the bud.

A knowledge of the impurities of water should be possessed by every householder, for such knowledge is of so much vital interest to the community at large, that it should not be confined simply to medical health officers, chemists, and physicians. We can easily recognise the importance of this when we reflect that from a polluted water supply in one house only, an epidemic of cholera, typhoid fever, diphtheria, diarrhœa, low fever, or erysipelas may arise and spread rapidly through a whole town or village.

It will be useless to attempt to classify individually the harmful impurities of water, as they are generally combined in the same sample, but for chemical purposes we may classify them as under:—

a. Ammonia.
b. Nitrites.
c. Chlorides.
d. Lead.
e. Organic matter.

In making an examination for these impurities the first step to take is to provide oneself with a spirit-lamp, a few test tubes, some tall glasses, measures, and the solutions I name further on.

By way of preliminary, take about a quart of water, place a small quantity of it in a perfectly clean measure and hold it between you and the light, and carefully examine it for any suspended impurities, care being taken not to mistake air bubbles for them.* Next examine the colour, and observe if there is any *turbidity*, or in other words, milky appearance. This is done by looking down into the water in a tall glass placed on a piece of white paper. Then notice the smell, if this is unpleasant it is certainly unfit for household purposes. Heat a little of the water and add a little caustic potash, and smell again for any unpleasant odour. We call this the *physical* examination, and learn a good deal from it.

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* Perfectly pure water has a bluish tint, and permits the bottom of the water being distinctly seen.

The next step is the *microscopical* examination. Collect the sediment by allowing the water to stand for twelve hours, and then examine it carefully with a microscope for living and dead vegetable matter and other particles. This method, of course, cannot be adopted unless some knowledge is possessed of the use of the microscope.

I will now briefly explain the chemical examination.

Ammonia.—By *Nessler's re-agent.* Bulbs of this can be bought at any chemist. Break one in powder, and add it to the water. If ammonia is present, a yellow or brown colour, or a brownish precipitate will be produced.

Nitrites.—Obtain from a chemist a solution of sulphuric acid (pure) and a solution of iodide of potassium (5 grs. to the ounce), half fill a test glass with the water, add first five drops of the sulphuric acid and then five drops of the potassium solution, and lastly pour in a small quantity of freshly-prepared starch solution. If nitrites are present, a blue colour will be at once produced, and the water is unfit to drink.

Chlorides.—Obtain from a chemist some nitric acid (dilute) and a solution of nitrate of silver. Put some of the concentrated water in a test tube, and add a few drops of dilute nitric acid and an excess of the nitrate of silver solution. If chlorine is present the water will become milky. This last applies to ammonium compounds as well as to free ammonia.

Lead.—Boil about 4 ounces of the water, pour a few drops of hydrochloric acid into it, and then pass sulphuretted hydrogen through. Should a trace of lead be present, the water will become brown or blackish. Lead often gets into pure water by reason of the water passing through leaden pipes. It is a most insidious poison, and is indicated by debility, sore gums and mouth (with a *blue line* along the gums), and paralysis of the wrist. The silicated carbon filters will remove lead. Dr. Angus Smith's bituminous varnish for coating pipes prevents lead contaminating the water.

Organic Matter.—Fill a tall, clean glass vessel with the suspected water, and add a solution of potassium permanganate (one grain to two ounces) sufficient to give it a pink tinge. Do the same with some distilled water in another glass, and compare the two specimens by placing the two glasses side by side on a white piece of paper. If discolouration takes place at once in the suspected water organic matter is present.

CHAPTER V.

SANITATION.

THE very rapid strides sanitation has made of recent years have already borne beneficial fruits in the decreased death-rate all over the country, but still much remains to be done in this direction, and the subject should be studied by every householder. The chief point of importance in building or choosing a house to live in, should undoubtedly be the sanitation. People constantly take a house on account of its locality, its architectural beauties, its garden, etc., but scarcely ever trouble themselves to ascertain whether its sanitary arrangements are perfect or not, with the result that they frequently find, as their predecessors found before them, that such arrangements are in a deplorable condition.

It is well to bear in mind the fact, that although on a superficial inspection the sanitary arrangements may appear to be in good order, yet this need not necessarily be the case; for when a house has been vacant for some time and the drains constantly flushed with water, no perceptible smell will be detected—such smell will only arise after they have been in use again for a short period.

Some of the old houses can no more be made sanitary than they can be properly ventilated. The old drain pipes are, as a rule, past redemption, and the soil underneath the house is often impregnated with sewer soakage. No amount of money or sanitary skill can put these old *death-holes* in a fit condition in which to live. It may not, perhaps, be out of place to give an experience of my own of some years back, when I took a house in one of the leading thoroughfares in London. Shortly after taking possession I found, to my horror (my suspicions being aroused by all the inmates of the house suffering from bad throats) that there was no proper system of drainage, but merely a gutter made of bricks under the kitchen floor and with which the rats had played havoc.

Much greater attention has been paid to sanitary matters in the houses built during the last few years, and I believe that very few houses are now finished without a bath-room with a supply of hot and cold water, proper sized lavatories with a flush cistern and ventilating shafts communicating with the drain pipes; but it is always well to see that all these are in good working order. I would strongly recommend that, when building or selecting a house, a good practical sanitary plumber should be employed to inspect the sanitary arrangements, and that especial regard should be paid to the following points:—

a. The bath-room should be of a sufficient size, with no drain pipes near it, and the water pipes in no way connected with them. The supply of hot and cold water to be sufficient and easily adjusted, with the pipes fixed in such a manner that they can be inspected without much trouble.

b. The lavatories should be spacious, airy, and light, and ventilated as I have described in my chapter on ventilation. The pan of the closet should be without woodwork, made of white glazed earthenware, with the machinery easily workable and not liable to get out of order. The flushing with water, rapid and complete, removing everything without permitting reflux of foul air.

c. Waste-water pipes and sink pipes should not lead directly into either the soil pipes or drains. They should be carried outside the house and emptied into a gulley trap.

d. All soil pipes and drain pipes should be carefully ventilated by pipes carried to the roof or parapet of the house; these should be properly protected. The pipes should be laid on a marked gradient having a fall of 1 to 40 (4 inch) or 1 to 60 (6 inch). They should be made of glazed earthenware, free from roughness or inequalities on the inner surface and jointed with good cement, every joint being perfect.

e. It is always wise (particularly if you are about to build a house) to make a thorough inquiry as to the site, and also the nature of the subsoil, so that no cesspools, old drains, or ash pits may escape notice. This information is difficult to obtain when the house is already built, but by perseverance it can generally be ascertained.

f. No drain should traverse the basement of a house. Pipes should be made of glazed earthenware, securely jointed, and laid on a bed of concrete made with cement.

g. All pipes, drains, and everything connected with the sanitation of a house should be easily *get-at-able*, so that they can be frequently inspected and not hidden away, as they generally are in old houses, where you have to pull about half the house down before they can be inspected.

h. A clear plan of the drains and pipes should be demanded at the time of purchase, or taking a lease.

The above-named points principally apply to houses in London and large towns where there is a complete system of main drainage. To discover flaws in the drains and pipes within a building, the various fittings, traps, closets, etc., must be each and separately examined, every seat and all the woodwork being removed so that the fittings may come into view. If the flaw is not found in any of these, let one person pour some oil of peppermint down the soil pipe from outside, whilst another perambulates the building. Any leakage too small even to allow the visible escape of water will be soon discovered. All doors and windows must be closed for the examination to be carried out successfully. Sulphur can be burnt or æther, or the smoke test may be used instead of oil of peppermint, but I much prefer the latter, Dr. Constable Maybury informs me that he has found out flaws with the oil of peppermint test which entirely escaped notice when the other tests were used. I would advise people living in the country, where such a system is not in vogue, not to depend on any drainage at all, except for the waste water, and to have the lavatories entirely on the dry-earth system, than which, if carried out rigorously, there cannot be anything more sanitary. Cesspools are most dangerous, and should never be allowed. I, myself, if living in the country, would most certainly prefer to have no sewer near me, and consequently with no risk of sewer gas permeating the house, and to use, instead, dry earth, which acts as a splendid disinfectant.

Another great source of danger to the inhabitants of towns, and one that requires some radical change, is the storage of house refuse. I am most decidedly of the opinion that the old dust-holes, which are placed either in the back gardens or areas, should be promptly done away with, for they are centres of infection, and places in which the microbes and bacilli of every infectious disease germinate and flourish. I am sure it is perfectly disgusting to walk down some of the best streets in London on a close summer's evening, and have your olfactory nerves offended by the smell of decaying animal and vegetable matter arising from these cesspits.

I entirely agree with the parish authorities that no animal or vegetable matter should be thrown into the dust-holes, but that it should be carefully dried and cremated behind the kitchen fire. No smell arises from it if it is well dried before being burnt, so that no objection can be raised on that score. The dust-hole, as its name implies, is intended for cinders and dust only and nothing else. I think the most sanitary way of dealing with the question is to have a small dust-bin, such as is now commonly in use, which can be taken out by the dust-man and emptied daily. A small quantity of some disinfectant powder ought to be sprinkled over the bottom daily. I believe these dust-holes, which are, as I have said, veritable centres of infection, have much to answer for, and that they are in a great measure the cause of the epidemic of diarrhœa which usually visits London about July. The great difficulty we have to contend with is that we cannot regulate our neighbour's dust-bin, and although we may be most careful in attending to every sanitary rule concerning our own house refuse, yet we cannot compel our neighbour to do the same; with the deplorable result that if there is but one neglectful householder in a row of houses, the effluvia given off from his cesspit may permeate the rest of the houses, and a nuisance, if nothing worse, immediately created. Of course the sanitary authorities ought to see that everyone attends to the proper sanitary regulations.

I will conclude with a few words on a new safe disinfectant for household purposes:—

Since this chapter was written I have had brought under my notice a disinfectant substance to which the name of *Izal* is given. I have very carefully examined into the virtues of *Izal*, and the results of such examination lead me to believe it is the most suitable domestic disinfectant I have yet investigated, for the following very important domestic reasons:

a. It is non-poisonous and perfectly harmless to human beings.

b. It has no corrosive or caustic properties, thereby making it exceedingly valuable for disinfecting clothes, furniture, etc.

c. It is a very powerful antiseptic, for when diluted in the proportion of 1 in 200 parts, it destroys the vitality of germs which are believed by the present school of scientists to be the cause of Diphtheria, Typhoid Fever, and even Cholera.

d. Its disinfecting properties are shown by it rendering foul discharges from the nose, lungs, bladder, and bowels quite inert, and destroying all unpleasant smells.

I consider, from the harmless character of Izal, it is the safest disinfectant to always have in the house. We cannot say this about Carbolic Acid, or Corrosive Sublimate, which are also powerful disinfectants, but powerful poisons as well.

Izal can be used with advantage for a number of domestic sanitary purposes; viz., to disinfect all drains, sinks, lavatories, dust-bins, utensils, clothes, etc.

It is also very effective as a local agent when properly diluted; as a dressing for wounds, and ulcers, as a gargle for ulcerated sore throat, and foul discharges from the nose and ear.

There cannot be a question about the necessity for always having a non-poisonous disinfectant in the house, in fact, we cannot live a healthy life without one. I am sure both the profession and public will be grateful to Mr. J. H. Worrall, F.C.S., the eminent chemist, for having discovered so safe and powerful a disinfectant.

CHAPTER VI.

BUILDING AND ARCHITECTURE.

A SLIGHT knowledge of this subject should be possessed by everyone who contemplates the pleasure of buying a site and building a house thereon; for as houses are the most immovable things when once erected, it is, to say the least, very mortifying to find that there is a far more healthy and agreeable site close by, and which was equally attainable if we had only exercised better judgment. If an unsanitary site is selected, the house is sure to have a record of sickness, the cost of which will add materially to the money invested in the bricks and mortar, to say nothing of the many discomforts and miseries connected with illness generally. Building a house

I always compare to buying a horse; such of your friends as have any interest in the concern are practically your enemies for the time being, and you are to a certain extent obliged to rely on your own care and judgment in ascertaining the healthiness of the site. We must first of all bear in mind when building a house, that in order to ensure good health we must carefully look to the prevention of any of the following, viz.:—

a. Diseases arising from unhealthy site,
b. " " " bad soil,
c. " " " insufficient ventilation,
d. " " " tainted or deficient water supply,
e. " " " defective drainage,

all of which I have already discussed in former chapters, and which I may say are invariably associated with dwellings which are faulty in situation, construction or hygienic conditions.

In selecting a site carefully examine the nature of the soil, whether dry or wet; and its composition, whether sand, clay, or made up of cinders; if the latter, great care should be taken in ascertaining for how long a time the cinders have formed part of the site, for great evil often arises from building on cinder heaps containing vegetable matter. Dr. Parkes says, "No excavation should be used for the reception of cinder refuse unless it is efficiently drained, and should not be built upon for two years from the date of the last deposit." If the land has already been used for building purposes, careful search should be made for cesspits, old drains, etc. *Vide* chapter on "Some Natural Conditions Affecting Health," page 180.

Having satisfied ourselves that the soil is suitable, we should proceed to view the general conformation of the ground and try to select an open aspect where abundance of light and a free movement of air can be obtained.

The next thing to be done is to make

the acquaintance of an honest builder; and I may say in passing that it is not always judicious to take such honesty for granted. After the architect has drawn the plans and submitted them, with red and blue lines carefully pointing out the system of drainage and water supply agreed upon, a written contract should be drawn up stating the kind and composition of the bricks and mortar, the quality of the woodwork, pipes, lavatory fittings, and ventilating apparatus proposed to be used, and in short everything appertaining to the general construction. It is unwise to make too close a bargain, for if you do the builder will probably get the better of you. I have mentioned in the chapter on sanitation, how necessary it is for the pipes to be so fixed that they can be easily inspected for leakages, etc. *Vide* the description of Blackman and Smead's plan for ventilating and warming (*vide* page 40).

To prevent a house being damp it should have for its foundation a bed of concrete, and there should also be constructed what are called dry *areas;* which are formed by leaving a space between the main wall and a thin outer wall which reaches to the ground level, the two being joined together at intervals by stretching bricks. There should also be hollow walls all up the house with perforated bricks introduced at suitable distances.

I have already stated that I would certainly never advise anyone to build a cesspool in places where there is no regular drainage, but would recommend the thorough adoption of the earth system, and such being the case, there is no necessity for me to discuss here the building and construction of cesspools.

Where there is abundance of room the lavatories should be built away from the house, and the space between might be pleasantly occupied by a nice green-house which could have two distinct passages, but in a large town where space is a matter of the greatest impòrtance the best position is in an isolated block, built tower fashion, with a lavatory on each floor and if possible double windows with ventilating panes (*vide* chapter on "Ventilation"). The whole should be roomy, well-lighted, and have a sanitary look.

In my opinion the dry-earth system is by far the best in a sanitary sense, and should be adopted whenever building a house with any land adjoining. It only requires intelligent management, a plentiful supply of dry earth, and suitable means of disposing of the excrements.

After the brick and woodwork are completed, the house supplied with suitable grates or stoves for warming purposes, efficient apparatus for ventilation provided, and the sanitary arrangements completed, there is still something further to be done to make the house cheerful and hygienic, viz., the covering of the walls with paint or paper. I certainly prefer the former, more especially in town, for you can have it painted with most delicate colours, and all the dust and dirt which cling to it can be easily washed away every year or oftener. A glance at the water in the work-man's pail after the washing is done will sufficiently show the necessity for the suggested cleansing. Some people prefer paper. Their contention is that painted walls look so cold and comfortless and that papers are more artistic. Well, *chacun à son goût*, and as wall-paper is now made capable of being washed, it possesses the same advantages as paint and can be treated in the same manner. Wall-papers, other than those of a green colour, frequently contain arsenic, which produces dyspepsia, irritation of the mucous membrane of the nose and eyes, also obscure nervous symptoms. The most important thing in the choosing of papers is to avoid selecting any with rough surfaces, or such as are covered over with small hillocks, for they are most unsanitary, and allow dirt, dust, and microbes to accumulate all over the room, and by reason of the inequalities of their surface it is impossible to clean them properly. People would never dream of having a rough paper if they only saw the amount of dirt that can be got off any of the heavy red flock papers after hanging a few years. With such an accumulation of dirt it is impossible to keep any room sweet and wholesome, no matter how much time is spent over it, for the wall is saturated with a miscellaneous collection of particles coming in either through the window or given off in the action of respiration, and from the combustion of coal, gas, or oil.

Although our taste may lie in the direction of artistic papers for our sitting and sleeping rooms, we should never carry that taste into the kitchen, lavatories, etc., for ordinary wall-paper is not at all suitable or sanitary for such rooms. These rooms should be painted or covered with highly-glazed, washable, hygienic paper, which cannot absorb anything, and upon which dirt cannot get any great hold. It is well to draw the reader's attention to the fact that there are several authenticated cases of chronic arsenical poisoning by wall-papers. Many manufacturers use Sheele's green, because of the cheapness, in the colouring of papers, particularly green papers, although papers of various colours may contain it, such as lilac, maroon, blue, etc. It is certainly not essential to use arsenic for the production of a green pigment, for excellent green pigments are now made without arsenic entering in any way into their composition. The symptoms of chronic arsenical poisoning are irritation of the mucous membrane of the eyes and nose, chronic dyspepsia, and derangement of the nervous system.

The above few prominent points concerning building and architecture, which appear to me to be essential if we desire to live in a healthy dwelling, will, I trust, find favour with the reader, and although the subject is not fully gone into, and therefore is to an extent incomplete, I trust enough has been written to encourage people to think something about the hygienic, as well as the artistic side of architecture, when building or selecting a dwelling-house.

We may, I think, safely assume that

the demolition of workmen's dwellings in the overcrowded districts will not eventually be to the disadvantage of the workmen; for small houses can be built for them, on sound sanitary principles, a little distance out, where there is plenty of room for improved accommodation at a reduced rent. Working men's trains will carry them to their daily toil at fares which, added to their rent, will not make the amount of their expenditure more than they formerly paid in some unhealthy slum.

CHAPTER VII.

FURNITURE.

At first thought it may seem that furniture has very little connection with hygiene, but on further looking into the subject, and considering the amount of dust and dirt which some kinds of furniture harbour, it will be at once clear that it plays no unimportant part in the subject of domestic hygiene. Old-fashioned heavy oak furniture, heavy curtains, thick Turkey carpets and tapestry cannot be sanitary, for it is impossible to get at the dust that collects in them. Heavy furniture cannot readily be moved without assistance, and it is only after some years, when it is moved for the purpose of papering the walls, that a collection of all kinds of particles are made visible to the eye. Turkey carpets absorb all kind of dirt, which cannot be brushed out by any amount of energetic brushing. Curtains also do the same; so what with furniture which cannot easily be moved, a carpet underneath it which cannot be taken up until the furniture is moved, and curtains hanging for an indefinite space of time without being cleaned, the reader will easily understand that however well the servants may do their duty, they cannot keep a room under these conditions in a sanitary state. There is always a *musty* smell about the room which anyone coming from the fresh air can at once detect. This is found particularly to be the case in large houses in the country, where either the traditions of the owner's forefathers in the way of furnishing have been carefully followed, or the furniture belongs to that period commonly referred to as "*the bygone ages*," and perhaps has not been moved for generations. This may be fashionable and give to the room a certain amount of cosiness, or gladden the eye of the antiquary, but for all that it is not healthy; in fact, if our eyes were furnished with higher magnifying power we should confess it was disgusting. The pure air from outside cannot find its way in, for it is barred by heavy bookcases, sideboards, etc., all of which prevent its free motion in any way.

I remember one case where a gentleman who had made a note of the fact that whenever he went to his country house, and remained in his library for a day or so through stress of weather, he always felt ill; he, I am pleased to say, was sensible enough to follow my advice and have the room turned thoroughly out and cleaned. When he consulted me again he said he was not at all surprised at his being ill, for the amount of dirt collected from the room, furniture, and fittings was sufficient to choke a dozen people.

In furnishing a house, after having seen the rooms are in a sanitary condition for receiving the furniture, I should choose light elegant furniture that can be easily moved about by two servants. The carpets may be Turkey, Persian, or Brussels, notwithstanding what I have already said, so long as they are not placed under the heavy articles in the room, and can be easily taken up on occasions and well shaken. The curtains should consist of some washable material, or such as can be easily cleaned. It is important to place the furniture in such a position that it does not interfere with the ventilation or light of the room.

The way to place furniture so that it does not interfere with ventilation or light and yet looks cosy and comfortable, requires an *artistic* eye for space, that everyone who is furnishing a room should possess; if unfortunately an artistic eye is not one of their accomplishments, then they should delegate the office to some one who has.

I must candidly confess that I think it is an agreeable sensation to go into a room where the eyes are not offended by resting on any ledges of dust, and the olfactory sense is treated to that wholesome smell which we distinguish by the term *sweetness*. Considering the amount of time we, in this country, spend in our own homes, I think it must be detrimental to health if hygienic furnishing, such as I am endeavouring to describe in this chapter, is not carried out. Who can tell whether some such diseases as typhoid fever or phthisis has not been caught by sitting in rooms which are only capable of being superficially cleaned out, for it has been demonstrated beyond any doubt that the microbes which are found in, and are peculiar to, these diseases are most tenacious of life, and can become active after being many years shrivelled up, provided they happen to alight on a suitable soil.

As illustrating this wonderful tenacity of germ life, I need only refer to the many well-authenticated cases of wheat sprouting up and bearing fruit after having been buried in a coffin for hundreds of years. If a grain of wheat can so retain its vitality for so long a period, and when put into a suitable soil begin at once to germinate and produce more than twenty fold the original quantity, it is not, I venture to say, at all unreasonable, when we look at the matter in an ordinary scientific manner, that a microbe of *consumption* may, through some means or other, get into a room and become lodged in some article of furniture, and there remain in a shrivelled up and dormant condition for a long time before being disturbed, and then eventually find its way into the lungs of a person prone to the disease, there to germinate and produce a colony of microbes, which in turn bring about all the symptoms of tuberculosis and destruction of the lung substance.

Space will not permit of my arguing the point here, but I think the reader will agree with me that such a series of events is not by any means impossible, and that it is better to use every hygienic method to reduce such a possibility to the minimum of probability. It will not, I think, be out of place here to add that rooms inhabited by invalids suffering from *consumption*, or any chest disease which produces expectoration, or, in fact, any disease in which particles of the skin, or those derived from the secretions of the body are given off and carried about until they find some resting-place, should be thoroughly cleansed and disinfected—the furniture as well as the room—before they are used as dwelling-rooms by healthy people. There cannot be the least doubt that people who buy second-hand furniture run all kinds of risks, for who knows what infection such furniture may have been exposed to. I therefore strongly recommend that all second-hand things should undergo a purifying process before being placed in the house.

Having furnished all the sitting-rooms in the manner described, we must now devote our attention to the sleeping apartments. These, if anything, require more care than the sitting-rooms, for we usually spend about ten hours out of the twenty-four in them—some people a good deal longer. The chief thing to bear in mind in the selection of bed-room furniture, is to avoid its being cumbersome or bulky. I am pleased to say that of late years bed-room furniture has much improved from a sanitary point of view, if only in respect of the abolition of those big, cumbrous *four-posters*, which, with their heavy hangings in the shape of curtains, were the bugbears of a sanitary scientist. In some of the old houses in the country, possessing large rooms with small windows, when you got into one of these extraordinary bedsteads and pulled the curtains no possible ventilation could exist, and one is only surprised that the sleeper was not asphyxiated whilst asleep.

The bedstead should be of brass or iron, without any hanging. The most comfortable and healthy mattresses being thin horsehair, supported by another mattress made of chains; these mattresses certainly greatly aid in procuring undisturbed sleep, when one gets used to them. Brass or iron bedsteads with chain mattresses must be by far the most hygienic, as the material cannot harbour any dirt, dust or insects, and the whole can be easily got at and thoroughly cleaned. In the winter a soft flock mattress can be placed on the chain mattress. The feather-bed, so long considered a luxury, is not only unhygienic, but does not rest the muscles of the body sufficiently, for the reason that the bed being uneven some muscles are being rested at the expense of others, and causes the sleeper to arise from his bed without that refreshed feeling which should follow a healthy night's sleep.

I shall in the chapter on clothing deal with what I consider is the best covering for the purpose of keeping the body warm when asleep. Having now gone into the subject of furniture best suited for all the rooms in a dwelling, I will conclude my remarks by pointing out that I think the great art in furnishing is only to place in a room things that are essential for use and ornament, and not a quantity of useless articles that only gather dust and dirt, and prevent free circulation of fresh air in the room.

I had one of the most useful articles of furniture, I ever came across, made for me for the bedroom. It was a combination of a set of drawers, a looking-glass, a washing-stand, a writing-table, and a towel-rack. When closed up it looked like a very handsome mahogany writing-case. This, a brass bedstead, and a comfortable divan chair were the only articles of furniture I had in my bedroom.

CHAPTER VIII.

NURSING.

In the article on preventable diseases we have seen what an important share good nursing has in the treatment, and it can be easily shown that efficient nursing plays an equal part with medical skill in the cure of every disease. The doctor is only with the patient a few minutes, and after making a diagnosis and prescribing a certain line of treatment, leaves the patient in the care of the nurse to faithfully carry out his instructions. If the nurse for want of knowledge or experience does not do so, the disease may undergo a change for the worse before the doctor's next visit; and many deaths have doubtless to be recorded as due to bad nursing. Such a position to which so much responsibility is attached, should not be undertaken lightly. I think it behoves every mother to study carefully the rudiments of nursing the sick. In the course of life every one at some time or another is called upon to fulfil that office, and even if we are not obliged to take entire charge of a patient, what charitable service can we not render by relieving the trained nurse, and thus enabling her to snatch a few hours' sleep, or go out for a few miles' walk to refresh body and mind.

People whose incomes are small cannot indulge in the luxury of trained nurses for their sick ones. It is therefore the middle class which is too badly off in this respect, for the rich can procure the services of a trained nurse, while the poor are provided with them in our hospitals and other charitable institutions, where we find so many ladies voluntarily devoting their time to such duties. I would have no class entirely dependent on the professional nurse, and, as I have already stated, every parent should know sufficient to be able to perform the duties of a nurse in all cases of illness when unaccompanied by complications.

Professional nurses have been much abused in various papers during the last few months, in fact, I might add all professions have had their turn, but from practical experience I believe the abuse is not justified, and although there may be some black sheep in the fold, the majority are efficient, charitable, and ever ready to benefit mankind.

Nursing being such a very serious profession with its many and heavy responsibilities, it is a great misfortune that fashion has crept in and made the calling popular, romantic, and sentimental; for of recent years hundreds of women of all ranks have enrolled themselves under its banner, not so much on account of the serious duties of the profession, but in order that they may be able to go about in its attractive uniform, and thus excite a certain amount of interest and notice.

I think this is very despicable, and that is one reason why I should advocate the uniform not being worn outside the sick-room. I would retain its use in the sick-room, as I believe that at the bedside an attractive uniform on a genial healthy-looking nurse acts as a tonic to the invalid. Another disadvantage with the *fashion nurses*, as perhaps I may term them, is that they are often physically unfit for the arduous duties to be performed in the calling.

There can be no doubt that a woman to be fully qualified for nursing should have an even temper, a genial disposition, be physically strong in mind and body, blessed with sound health, and endowed on entering the profession with the knowledge that the work she will have to perform will for the most part be for charity. Although in nursing every labourer is more than worthy of her hire, there is nothing to be made in a pecuniary way out of it. If the nurse has all the qualities which I consider essential, and is also skilfully trained, she will be respected and welcomed wherever she goes, beyond this she must expect little or nothing. I certainly think there is no calling more sacred; and that the silent heroic deeds performed by nurses on fearlessly entering the chamber of some awfully infectious or contagious fever, and administering to the comfort of the helpless or dying invalid, or in standing unflinchingly by while some terrible operation is being performed, are equal to the bravest deeds ever performed on the battle-field or on the mighty deep.

Although all cannot possess the qualities which are necessary to make an efficient professional nurse, who has to attend to all kinds of patients and diseases (some of the former would, I am inclined to think, even try the patience of Job), every mother can cultivate the necessary qualities sufficient to do duty in her own household.

The first duty a good nurse should attend to is the hygiene of the sick-room. She ought to be well versed in domestic hygiene, and know what to do with respect to ventilation, furniture, and preventable diseases, and which, although I have already discussed it in preceding chapters, I will briefly recapitulate here.

a. Enforcement of a strict domestic quarantine by isolation.

b. To see that the room is well lighted, and sufficiently ventilated by means of open windows and fires if necessary.

c. Removal of all extraneous furniture; such as carpets, curtains, etc.

d. Immediate removal of all slops and soiled linen, and seeing to their disinfection.

e. Disinfection and instant removal of excreta.

f. Judicious selection of aërial disinfectants.

g. In cases of infectious diseases, seeing that a sheet steeped in disinfectant solution is hanging outside the door.

h. Disinfection of empty rooms after a case of infectious disease. (This last office is now generally performed by the sanitary authorities.)

A nurse should be especially hygienic concerning her own person. The most sanitary dress to be worn when attending fever cases is either a cotton or holland dress, which should when washed be highly glazed by means of starch to which glycerine has been added and the application of a hot iron over its surface. Another dress should always be kept in readiness hanging outside, which should be put on after leaving the room and worn when mixing with other members of the household. A white cap should cover the whole of the hair, this can be dispensed with when leaving the sick-room.

It is also wise, immediately on leaving the patient, to wash the hands in a weak solution of Izal, and also to gargle the mouth with a similar solution. The dietary of invalids must always be assiduously studied by every attendant on the sick, and the diet prescribed by the medical attendant faithfully carried out to the letter. Great care should be taken that the food is fresh, properly cooked and presented to the invalid in an appetising form. The amount or quantity must be regulated according to the condition of the patient at the time. After the meal is finished every particle of food left had better be removed from the sick-room and destroyed, this can be avoided by not taking too much at one time into the room. From personal experience I have always found it a good plan not to say a word to the patient about food, unless he should ask for it, but at the time prescribed to take the food to him and persuade him to eat it. I have constantly found that the mere thought of food brings on a feeling of nausea, whereas by suddenly presenting some dainty, well-cooked dish, an appetite is frequently induced. I need hardly say that it is the nurse's duty to see that no food or drink is given to the patient that is not ordered, no matter how earnest the appeal may be for it. A firm, kind refusal backed up by an intelligent reason is generally sufficient to get the attendant out of the difficulty.

As the medical practitioner only sees, as I have before stated, the patient for perhaps a quarter of an hour, the nurse should possess good powers of observation, and note everything that may occur during the time she is on duty, and she should give instructions to anyone who may act as her deputy during her absence to do the same.

The important points to be noted are as follow:

a. Amount of sleep patient had, if peaceful or disturbed.

b. The quantity of food and drink consumed.

c. The temperature of the patient at the time named by the doctor.

d. The condition of the secretions and excreta.

e. Any unusual symptoms that may strike the nurse as abnormal, particularly if they occur soon after medicine is administered.

It is always well not to trust to memory in recording the points I enumerated, but to carefully record the facts in a notebook at the time of occurrence. This not only saves the doctor in attendance time, but teaches the nurse practical experience, which, I need scarcely say, is worth more than ten times the same amount of theoretical knowledge. Besides the above advantages it makes the nurse more precise and businesslike, and prevents any error or mistake that might make the doctor give a prognosis unfavourable to the patient's recovery, which a difference in the temperature of two or three degrees might do.

Some branches of nursing require much

practical experience, and no amount of direction or description will enable an amateur to perform the duties efficiently without practice. For instance, lifting a patient up while clean linen is put on the bed, or lifting a patient out of one bed to another without injury; these we must practise upon a healthy individual before trying our hands on the sick. The best method of doing the former is to gently insert the palms of the hands under the shoulder blades, back, and lower extremities of the patient, two people being engaged in the operation, while a third is ready to place the clean linen on the bed. By exercising patience, and lifting at exactly the same time, an invalid of ordinary weight can be easily raised without discomfort. I, some years ago, had a very useful apparatus constructed for this purpose for the use of my own patients, and I found it not only a great benefit for nearly every kind of disease, but a perfect boon in the case of people suffering from rheumatic fever. It consisted of two strong posts screwed into the floor, one placed at about the middle of the head of the bedstead, the other opposite, just beyond the bottom of the bed, with a strong beam extended and screwed into the top of the posts. Three broad canvas bands were made, two a foot wide and one two feet wide, with ring holes on each side, and marked A, B, and C. A went under the shoulders, on which a small pillow could be placed to support the head; B (the wider) was always placed under the back, and this was provided with a clean linen covering which could be constantly changed; and C was placed under the lower extremities. Hooks on strong cords were then attached to the ring holes in the bands, the cords being carried through holes in the beam and over rings at the ends of the posts and fastened. The patient could either be lifted by two people gradually pulling the cords, or, better still, two hand wheels could be employed for that purpose. I found any local carpenter, with a few instructions, could easily make such an apparatus, and the cost of making can be speedily recouped if it is let out on hire. Whichever method in lifting is used, great care should be taken that the patient is moved gradually without the least jerking, and to do this effectually everything should be in readiness before attempting the operation.

The sheets, blankets, etc., should also be ready to slip under the patient the moment he is lifted clear of the bed. There is some art and practice required to fix these properly. The best way is to have each side rolled towards the middle, so that immediately a sheet or blanket is placed under the patient two assistants can at once unroll it, and the bed is then comfortable and ready for use.

As invalids are frequently unable to feed themselves or take their medicine, the nurse must in such cases administer it to them. I have found the following the most practical method of performing this operation with ease and comfort to the nurse and patient:—Place a full pillow under the head of the patient and gradually raise his shoulders on to it, then place the left arm round the neck while the right hand is employed with the spoon. Wait until the mouth is open wide enough to admit the spoon, which then insert, carrying it to the middle of the tongue; instruct the patient to close the mouth and then withdraw the spoon. Sometimes it is necessary to tilt the spoon over, if the patient is so ill as to be insensible of what is going on. In this latter case the difficulty may arise that the patient will not open the mouth at all, in which case the unpleasant operation of *gagging* must be performed. A thick piece of wood, well-padded, and finally covered with oiled silk, is the most convenient apparatus. It should be gently forced into the mouth, near the angle of the lips, until the mouth is forced open far enough to admit a tea-spoon. The nurse must take great precaution to prevent the patient choking himself, and should be most careful to carry the spoon far enough into the mouth.

Besides having to nurse the sick, the amateur nurse in her own household is often called upon to attend to all kinds of minor accidents, which are too trivial in their nature to require the advice or aid of the usual medical attendant. Of late years the St. John's Ambulance Society has done an immense amount of good in giving lectures and holding classes on the subject '*of the first aid to the sick or wounded.*' The practical demonstration as taught in these classes is very valuable, and every young person should, I think, devote some time in attending them. I have, in my experience, constantly found households, in which there were a number of children, without any of the following important articles and which I venture to say every house should contain:—*(a)* bandages, *(b)* lint, *(c)* sticking-plaster, *(d)* a small sponge (new), *(e)* Friar's balsam, *(f)* sal-volatile, *(h)* Eau de Cologne or Florida water, *(i)* strong smelling salts. It is all very well to say these things can be easily obtained when required, but the time taken to get them only adds to the confusion, and may often be very precious time wasted. For example, take a case where, through some cause or other, a child has fainted; with the above remedies we could at once set to work. The child should be placed on a sofa or bed, the head being rather lower than the body, everything loosened about the neck, and the head and chest bathed, by the aid of a sponge, with Eau de Cologne, or Florida water, and a dose of from half to a tea-spoonful of sal-volatile administered, diluted with water; and strong smelling salts held to the nose. If this treatment was at once resorted to in most cases a speedy cure would be effected. Again, children will frequently fall or cut themselves; the bruises caused by the former are greatly alleviated by a prompt application of Eau de Cologne to them, and in the latter case the cuts, if bleeding, should be first washed with warm water, then with cold, a bandage tied round the part above the wound and a *pad of lint* saturated with some diluted Friar's balsam placed over it, and kept in position by another bandage. When the bleeding has stopped, the bandages may be removed and the wound painted with Friar's balsam. Flies, gnats, and mosquitoes often bite children and sometimes cause alarming symptoms, but these are generally prevented if the wound is at once sucked and a piece of lint, soaked in sal-volatile, at once applied.[1] By way of extra precaution a saline draught of Condal Water[2] should be administered.

Epilepsy commonly comes on without any premonitory symptoms. The child suddenly loses consciousness and falls. The teeth are clenched, froth issues between the lips, the body is convulsed. The symptoms may vary much in intensity. In such a case the child should be laid on the floor, the dress loosened around the neck; the windows opened to allow plenty of fresh air to enter. A large cork wrapped up in a handkerchief may be put between the teeth to prevent the child biting its tongue. The face sponged with Eau de Cologne. Nothing else need be done until medical aid is summoned.

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[1] Last autumn a medical man writing to one of the medical journals, stated he had obtained good results by application of petroleum oil (ordinary paraffine).

[2] Condal Water is in my opinion the safest Natural mineral water as a purgative for children, being rich in *Sulphate of Soda*, the best saline aperient. Condal Water has the additional advantages of being palatable, efficient and painless in its action. It is best administered in warm milk in doses according to the age of the child, *i. e.*, from one to four tablespoonfuls.

Infantile convulsions come on suddenly and call for immediate treatment. The infant should be at once put into a warm bath to which a table-spoonful of mustard has been added, for ten minutes, then dried. A dose of Hydrate of Chloral of two to ten grains added to a tea-spoonful of syrup, according to the age of the child, may be given at once if medical aid is not forthcoming. Sunstroke also calls for immediate treatment by the nurse. She should pour cold water on the head, place the child in a cool airy position with the head raised and sponge the body over with vinegar and water. A full dose of Condal Water should be administered at once.

In case of drowning, it is well to remember that our chief object is to get the water from the lungs; in order to do this, as no time can be lost, the child may be held, for some seconds, up by the legs, head downward. Dr. Sylvester's or Dr. Harward's method of performing artificial respiration should be at once resorted to as soon as possible, after which the child should be placed in a warm bath, and rubbed well with a dry towel. When consciousness returns a few tea-spoonfuls of hot brandy and water may be given or some sal volatile in water. There has been doubtless many a child lost through bystanders failing to apply these simple measures.

Before concluding this article, I will say a few words upon the duty of the nurse to the medical man in attendance. I am sure every intelligent amateur or professional nurse will agree with me that it is no part of her duty to criticise the doctor's treatment, but to faithfully and conscientiously carry out to the letter all his instructions. Should a want of confidence be felt in the medical attendant, then the right course to pursue is for the parents, etc., to dispense with his services, the nurse remaining quite neutral. I have heard of cases where nurses have not only interfered with the doctor's treatment, but suggested their own instead. I have, fortunately, never met with such silly creatures. Let us take for granted that there are some very ignorant men in the medical profession, but they all have to pass through a two years' course of practical anatomy and physiology, and afterwards pass a very stringent examination in these subjects, besides others connected with medicine, so that the minimum amount of knowledge the most ignorant doctor possesses is far greater than the maximum amount the most expert nurse can pick up in her training, unless she has been through the same course. It is practically impossible to repair a house without an intimate knowledge of the composition of the materials it is made of, how much more difficult the task of repairing the human body.

CHAPTER IX.

PREVENTABLE DISEASES.

I SHALL in discussing this subject keep strictly to the hygienic aspect of the case, and not touch at all upon the medical treatment of fever. When people live in large cities or among a populous community, no matter what care they take in the way of sanitary measures in their households or persons, they are always liable to come into contact with some infectious disease, and, as the common expression goes, *catch it*. It is, therefore, very necessary for parents, and all who have charge of a number of persons, to know something concerning infectious diseases, the course to adopt, and the measures to take best calculated either to prevent them or check their progress when they become epidemic. It is almost impossible to escape them altogether, for we may catch them when walking or riding in public conveyances, or they may be conveyed to us in the clothes clean from the wash, in milk, or through the media of air or water, and lastly, we may come into actual contact with the infected person.

The diseases referred to are termed *zymotic* and include *small-pox*, *scarlet fever*, *measles*, *chicken-pox*, *typhoid fever*, *typhus fever*, *erysipelas*, *diphtheria*, *cholera*, etc. They are preventable to a very great extent by taking proper sanitary measures. Physicians are now generally agreed upon the *germ* or *parasitic* theory when accounting for the origin of diseases, and as in the present day, it is just as impossible for *fresh* diseases (*i.e.*, diseases of a character entirely fresh and unknown to us) to originate as it is for plants or animals to spontaneously generate, it is, I think, hardly fair to press science to fully explain or account for the first origin of the germs from which zymotic diseases spring; and because science, although progressing with such rapid strides, is not at the present time sufficiently advanced to furnish a thorough and complete explanation, to absolutely decline to place any faith whatever in the germ theory. We might, to take a parallel case, just as well expect a Christian to throw up all faith in Biblical teaching simply because the origin or creation of the world is involved in so much obscurity.

Although such a fever as small-pox is infectious, in the true sense of the word, and no amount of filth will have any effect in producing it, and it is generally very easy to trace a pre-existing case, on the other hand typhoid fever and diphtheria sometimes break out, apparently spontaneously, under very bad sanitary conditions, and perhaps without there being another known case within miles of the outbreak, yet even in such instances a careful and diligent search will almost invariably show that this spontaneousness is not real, and its cause, or the link connecting it with another case, can nearly always be found. I have no doubt whatever myself that under unsanitary conditions the poisons of *cholera*, *typhoid fever*, and *diphteria* flourish and become more potent than when the surrounding conditions are healthy. Some fevers are only prevalent in certain districts; these we call *endemic*, and their cause is probably owing either to some sanitary defects or is connected with the soil or climate of the place. Then again there are fevers which we call *epidemic*, which are produced by certain influences, or at all events these influences seem to act as predisposing causes. It is very difficult to explain these influences, as, for example, why certain fevers should rage in a particular locality, at one time in a mild form, and at another time very virulently, or why cholera and influenza should be subject to periods of pandemic extension.

It is, however, very encouraging to think that with judicious care we can often ward off some of these dangerous diseases. For instance, take smallpox, if we are not faddists and so culpably blind as not to see that physicians and nurses, who are properly protected by vaccination, pass through awful epidemics of this fearful disease with impunity, we can prevent it by having ourselves and children skilfully vaccinated every seven years, when having taken this precaution we need not fear it. Again, with regard to typhoid fever and diphtheria; if our house is perfectly sanitary, and the water and milk supply above suspicion (if we make them so), these diseases need not, nor will they, trouble us much. I may add that in most cases of fevers something can generally be done to reduce the infection to a minimum. I trust that there are few people in the present day who are not sufficiently enlightened to understand that a child is much healthier who has not had any infectious disease, and that it is not essential or beneficial to our well-being for us to have them (a belief so common some few years ago), although I agree that few children escape altogether from infection when living in a town, and constantly mixing with other children.

As I have already intimated, we should always be prepared for the invasion of some infectious disease, and these remarks more particularly apply to parents, and all who have the control or charge of a large number of human beings. By way of such preparation. I would advise that a room should be selected away from other rooms, and at the top of the house, to be used in cases of infection. Of course it need not be always kept vacant for that purpose, but we should make a mental note of the room we propose using for such an emergency. In all cases of fever among the inmates of the house, those affected should be at once removed to this room, and *strict domestic quarantine by isolation* enforced. It is perhaps hardly necessary for me to add that the room should be well lighted and ventilated. All extraneous furniture such as carpets, curtains, and hangings should be removed.

The secretions, excreta, and all soiled linen should not be allowed to remain in the room, but be removed and disinfected, the former before they leave the room. A supply of disinfectants ought to be kept in the room, and as we are now discussing the subject, the reader will doubtless desire to know what disinfectant I would recommend. Personally speaking, I prefer *terebene*, on account of its agreeable odour, but I must confess that I do not think it is so powerful a deodorant and disinfectant as chlorine gas or carbolic acid vapour; but these latter are frequently a source of discomfort to the patient, the aroma being very sickening.

Izal fluid is a capital disinfectant for all soiled linen, which should be at once plunged into it. A sheet damped with the same fluid may be hung outside the bedroom door. Terebene or carbolic acid, mixed with half glycerine and half water, or with sweet oil, makes a capital disinfectant inunction for the body of a patient in certain infectious fevers in which the skin is shed, more especially in scarlet fever. No food or drink should be kept in the sick-room, except that which is absolutely necessary, for food soon becomes tainted when kept long in a hot room. Invalids' taste is often very dainty, and they frequently take a dislike to anything that their eyes have rested upon for any length of time, whereas the same food suddenly brought before them in appetising manner they will eat and enjoy. I would particularly caution nurses about keeping milk in a sick-room—this must never be allowed.

Everyone attending upon the patient should be bright and cheerful, and always try and make the invalid the same. I have gone fully into the question of nursing (*Vide* Chapter VIII, p. 87.) The room should also be rendered cheerful by a plentiful supply of fresh flowers being placed about it; the water supplied them must be changed daily, and all decayed flowers removed. After a case of any infectious or contagious disease the room should be thoroughly cleansed and disinfected, and the best method of doing this is as follows:—

Wash all the furniture with a solution of *Izal* (two ounces to a gallon of water), or with terebene soap; also the floor and all the woodwork. The wall-paper must be removed.

Remove everything from the room, close the windows and other openings tightly, and then place in the room a shallow basin containing three parts of ordinary bleaching powder (chloride of lime), and one part of strong commercial sulphuric acid; the latter to be added to the former. If the room to be disinfected is a large room, more than one basin should be used. Shut the door tightly, and keep the room closed for several hours. After this, throw the windows and door wide open for twenty-four hours, and after the walls have been re-papered and the ceiling washed with quick-lime, the room will be ready again for use.

CHAPTER X.

CHILDREN.

When we quietly think over the helpless condition in which we are brought into the world, and how beholden we must be to our parents or guardians for food, raiment, and health, it must, I am sure, make every conscientious woman ponder at the awful responsibilities she must incur on becoming a mother.

A want of knowledge concerning the domestic hygiene, as applied to the rearing of children, might entail serious consequence in the growth and constitution of a child, and there are thousands of cases where such neglect has produced disease in children who, at their birth, were healthy and strong, and who would have grown up so, provided their rearing had been conducted on scientific principles. The woman who studies horticulture carefully, and applies the same laws to the rearing of her children, makes the best mother. She knows how a tender plant when skilfully nourished, attended to, provided with pure fresh air and water, sheltered from the windy blasts and excessive sunlight, soon becomes strong, grows luxuriously, and in a very short time is enabled to take care of itself when planted out in the open. I often think the scientific botanist and gardener are constantly teaching the physician some practical lessons in regard to the growth of children, and that extraordinary results are produced by patience, care, nourishment, and hygiene. In my walks through our magnificent parks I have noticed the wonderful change for the better in the growth, colour, and beauty of the plants of late years; for example, take the present garden flowers and compare them with those of ten years ago, and you can hardly believe they are the same plants; the beauty of to-day being the result of an intelligent knowledge of horticultural hygiene and vegetable dietetics. I believe firmly that by applying the same laws to the rearing of a streetful of miserable, weakly, debilitated children, that you see in full evidence by taking a walk down the East-end, or even some parts of the West-end, any summer's evening, it would be possible to produce the same improvement in their physical condition as we find so beautifully exemplified in plants. The gardener knows only too well that if every attention is not paid to the growth of flowers, they will at once commence a retrograde movement, and the mother should know the fact also, for in the case of a child it means the deposit of the germs of some malignant disease which is much easier to produce than to eradicate. The poor child, quite helpless, without possessing any intelligence to guide himself, grows up only to learn at manhood that his life is blighted through bodily weakness. Of course we know among the poor and squalid the weak infant never lives to reach childhood, much less manhood, the percentage of deaths before the age of five being something appalling, and only points to Darwin's theory, *as to the survival of the fittest.* It is easy for us to understand that such a mortality ought not to be, and would not be, if mothers would only take the trouble to follow the skilled gardener, and become competent in the knowledge of infantile hygiene, and cautiously bring up their children guided by its laws.

A mother, therefore, should be careful as to the following particulars, as regards

a. Diet suitable and proper for children.

b. Clothing, due attention being paid to woollen material.

c. Ablution of the body daily, due regard being taken of the temperature of the water used, and quality of the soap employed.

d. To see that the rooms inhabited by them are properly ventilated, heated, and supplied with plenty of pure fresh air.

e. A regular and sufficient amount of outdoor exercise.

f. The teeth must receive regular attention.

g. The hair ditto.

h. Avoidance of chills, and any contact with infection of any kind.

i. Instant attention to any disease or ailment that may develop, and no abatement of treatment until thoroughly cured.

j. Sleep, a regular amount is essential.

I have no doubt some reader will think the above rather a troublesome list, but I venture to say that on reading it attentively a second time, she will agree that I have not advocated anything but what is essential to the proper rearing of children for them to attain that physical development of both mind and body which the present extraordinary fight for existence demands.

With regard to diet the mother should supply that herself, unless contra-indicated. If the infant is deprived of an adequate supply from that source, cows' milk diluted with water or lime water may be substituted, or asses' or goats' milk may be tried. After six months a food, the basis of which is fine wheaten flour, carefully subjected to heat, with a sufficient quantity of malt extract, may be added to the milk. I need not go further in this subject here, and for more special information I must refer the reader to the author's articles on the *Feeding and Rearing of Infants*.

There is no part of infantile hygiene so important as the covering of the body with suitable clothing. Cold is injurious to all very young children; it often kills, but more often stunts the growth of the body; that *hardening* which begins with washing the child with cold water, and then exposing its little legs and arms to cold winds, does likewise. The parent should reflect that a child, before it can walk, has no power like ourselves to generate heat by exercise, and can only be compared to ourselves if we were sitting out in the open air without moving our limbs. How often on cold winter and spring days do we meet with nurses and parents wheeling their little ones along, improperly clad, exposed to a keen wind? It is very hard to understand this want of reflection and reasoning on behalf of parents. They certainly do not follow this process of hardening themselves. What parents go about with bare extremities? They would shrink from doing it themselves, yet do not hesitate to inflict pain on their little ones, who are much less able to bear it through their skin being much more delicate and tender. There is another point I should like to call attention to, viz., the pain inflicted when the body is chilled, and that is the reason why babies so often cry when out of doors which, unfortunately, does not always call forth sympathy, but a good shaking for being *naughty*. Supposing the nurse or parent to be a philosopher, she might argue the shaking quickened the circulation and restored the warmth to the body!

There can be no difference of opinion concerning the best material in which to clothe a child, viz., wool, it possesses so many advantages, all of which I thoroughly explain in the chapter on "*Clothing*"; for children, however, it has another great advantage which I do not mention in that chapter, that is, its non-combustibility. We know when calico catches fire it blazes up like a piece of paper, but woollen texture does not burn but only smoulders, so that the fire can be easily put out. I am sure mothers will say this is a paramount advantage, considering the sad accidents we read of daily, where children are burnt to death through this cause.

I know of no more useful dress than a combination wool garment—a similar garment can be worn at night—such as is made of natural wool. These garments are very inexpensive, and the poorest child can be warmly clad. I need hardly mention that the thickness of such clothing should be modified according to season, light flannel specially made for summer wear, changed for heavy material in the autumn, winter, and spring. I may mention that the washing difficulty has been completely overcome, and woollen garments can be washed without shrinkage and kept nice and soft, as easily as cotton goods. Another important point to many is that they can be washed at home.

To take the hygienic points in order as I named them, we come to the ablution of the body daily. I need not lay any great stress upon this subject, for I believe both rich and poor acknowledge the necessity of washing the skin of children daily, although they do not always carry out the same laudable example with regard to themselves. In bathing children, particularly infants, it should be borne in mind that the skin is very delicate and tender, and far more susceptible to changes of temperature of the water than in older people. It is therefore wise always to have the water about the same temperature, not above 100° Fahr. in the winter, or under 80° Fahr. in the summer. To follow out this we must not trust to our hands to guess the temperature by, for they are very deceptive, but use a thermometer for that purpose, then there cannot be any mistake about it. The best time for the bath is the first thing in the morning or just before bedtime. I don't think too much washing is beneficial, and once a day is sufficient for the whole of the body (particularly in the winter), the hands, face, and feet, of course, will require washing oftener. If we were to judge by the mural advertisements, the selection of a *pure soap* would be a very easy task, but in reality it is a difficult one; the only advice I can give is to use soap as sparingly as possible, for a child who is washed daily cannot accumulate much dirt on the skin, and only use the soap that contains little or no soda or potash in it. Should the skin be very red, or broken, substitute oatmeal for soap.

I went so thoroughly into the hygiene of air, warmth, and ventilation, when dealing with those subjects, that I think it would be superfluous to go over the ground again, as my remarks apply to children as well as grown up people, so will, therefore, merely refer the readers to those chapters.

Daily exercise is more necessary when we are young than at any other period of life. As soon as a child can stand, it should be given a judicious amount of exercise in the open air, the mother being careful to see the amount is not exceeded, or the early signs of bent legs will appear; but after the age of three or four the bones, having deposited the phosphate of lime, become strong, and this strength is only increased by plenty of exercise. I think a hoop a capital toy for children, when it is used in a suitable place, it not only strengthens the legs and arms but also the heart and lungs. At the age of six a gentle course of gymnastics may be commenced, comprising calisthenics, dancing, and swimming, other[1] exercises being taught early according to the wealth of the parents. Many of the ailments of women would be prevented if girls were encouraged to strengthen their muscles, lungs, heart, and digestive organs just as their brothers do. All exercise to be beneficial should call into play the muscles of every part of the body, a rule too often forgotten by gymnasts. Dumb-bells weighing from 2 to 6 lbs. are splendid exercise for the arm and chest muscles. Drilling is also an exhilarating and healthy exercise; and with a little spice of the soldier about it, children of both sexes take very keenly to it, with the pleasant consequence that they grace the streets in after-life with the elegant stride and gait thus acquired. *Vide* chapter on *School Hygiene.*

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[1] It is very essential that all exercises should be taught as early as possible, as the muscles develop in accordance to the requirements of the exercise; for example, when riding is begun early the muscles of the calf develop greatly, which enable the rider to grip the saddle properly.

I now mention the importance to parents, and to all those who have the care and bringing up of the young, of a slight knowledge of the management of children's hair. It is a subject that seems to have been very much overlooked by those who write in order to teach mothers the proper manner in which to rear their children. If my memory serves me correctly, I do not remember seeing anything written about it in any of the popular journals that often have interesting articles on the subject of health and hygiene.

The hair when healthy, glossy, and abundant is, in my opinion, one of the most exquisite of the external ornaments Nature has given us, and adequately rewards us for any care and attention we bestow upon it. It very soon becomes brittle, dry, and 'shabby-looking' if neglected. The construction of the hair is very simple, but at the same time the mechanism is skilfully constructed in accordance with the beautiful mechanism that governs all the other parts of the body. It is in reality a part of the skin elongated, which is called a filament. This filament is attached to a bulbous root which is supplied with nutriment by means of a small artery. The filament is hollow and stained with various coloured pigments, that give the characteristic colour to the hair. There is also a small gland in connection with the root which secretes an oily substance which continually lubricates the hair. We have therefore in every hair of our head such a skilfully arranged piece of mechanism, that every hair is quite independent.

From the above very short description of the growth of the hair, the reader will at once grasp the chief point concerning it, viz., its fragile quality. It can be best compared to a very delicate flower which requires constant attention and care during its growth. The grower must not only provide it with proper soil, air, and sunshine, but must also regularly examine it, separate decaying leaves, or trim it according to circumstances. In like manner the hair must be properly nourished through the general circulation of the body, have plenty of pure air and sunshine, and be examined constantly, and cut judiciously. Considering the alarming amount of baldness one sees in the present day and particularly among men, (which certainly should not exist) the subject on which we are writing ought to be one of paramount interest to the general public. I have not the slightest doubt, that a large proportion of the premature baldness one sees in the present day is entirely due to neglect in the management of the hair in boyhood and youth. In discussing this important subject I think it better to do so under particular headings, as follows:—

a. Washing the hair.
b. Cutting the hair.
c. The use of washes and pomades.
d. Coverings for the head.
e. Brushing and combing.

Unfortunately for the public, the *hair specialist* is nearly always a quack who preys on the ignorance of his clients, which is, if possible, deeper than his own. These gentlemen are generally very talkative and wordy men, who seem to be able to 'gull' even their intelligent customers, and lead them to believe that they are savants in the art they profess to have so much experience of. I have often cross-questioned these specialists, and have convinced myself that they know nothing about the physiological growth of the hair, much less its minute anatomy, and that their treatment for diseased hair is merely empirical, carried out by means of recipes which they have copied perhaps from some chemist's recipe book, and which they recommend in almost all cases, paying not the slightest attention to the cause of the disease that makes the hair fall out. If people will consult such ignorant men upon a scientific subject, they can only have themselves to blame. On one occasion one of these gentlemen very much wished to singe my hair, after cutting it. I asked him 'what good singeing did?' He replied 'it prevented the cold getting to the brain through the hair tubes.' On that reply I declined to have my hair disfigured by singeing, as singeing in most instances is a useless operation, for nature herself seals up the tubes when cut. There is much controversy concerning the benefit to be derived from washing the hair. Those who are against the practice say very truly that the oil supplied by nature as a lubricant is all washed off, and in the majority of cases it is not renewed fast enough to prevent the hair from becoming brittle and dry, so that in time the hair falls out. I consider myself that due regard must be taken of the place you reside in, for example, children living in London would necessarily require the hair washed oftener than those living in the country. I consider that the hair does not require washing oftener than once a week in the very young, and once a fortnight after the age of five years. It should be thoroughly done. The water must be hot, and a little powdered borax added to the soap in order to dissolve out the grease and dirt. After it has been cleansed by pouring a quantity of lukewarm water over it, the hair should be carefully dried with a dry rough towel. It is, however, a mistake to rub the hair as if your object was to rub off the scalp, as commonly practised by hair-dressers. Lastly, it should be combed and brushed with a brush, the hardness of which ought to be in accordance with the thickness and strength of the hair. If the hair on getting dry becomes brittle, and loses its natural gloss, it is a good plan to rub over it a lotion composed of half glycerine and half rose-water. Some children's hair can stand washing much oftener than others; it entirely depends, as I have already stated, on the amount of natural grease secreted.

The next point to consider is cutting the hair, a routine gone through in all civilised countries. It does the hair good when the scissors are not applied too vigorously. To be of benefit to the growth of the hair the cutting should be more frequently done than is customary, and then only the ends should be cut off, in order that the hair may always be kept at a proper length. Cutting the hair close to the scalp may not injure the fast-growing hair of young boys, but if from any cause the growth should be weak, the scalp is exposed to cold, which tends further to stop the growth, and may also render it weak. I have always found that the most exuberant growth of hair in men of middle age has been amongst those whose hair has not been 'cropped' in boyhood. Girls' hair requires even more care than boys' as regards cutting: the ends ought to be regularly cut and trimmed.

I may say, speaking generally, that all washes and pomades should be eschewed, for children's hair ought to possess sufficient natural grease to make it glossy and soft, but should this natural grease be deficient, pomades of lanoline, vaseline, or bear's grease, are perfectly harmless. Chemical ingredients should only be added to the pomade in order to eradicate any disease of the skin of the head. I have already mentioned a lotion of glycerine and rose-water, which is also perfectly harmless, and is a good substitute for natural grease.

Due attention must always be paid to the covering of the head, for more often than not dry, loose, and weak hair is produced either through the covering being too hot in summer or too cold in winter. We must remember in selecting a covering for the hair the great vascularity of the scalp. I think the best covering for the head in summer is a straw hat, lined inside with flannel or a woollen material. In the winter a hat or cap composed of a woollen material, more especially in very cold weather. The main object being to keep the head cool in hot weather and warm in cold. The head-gear worn by men and women of the present day is most unsuitable, and doubtless tends to make their hair weak, dry, and loose.

Judicious brushing and combing of the

hair is of great benefit to it. Brushing with a brush, as I previously recommended, cleanses the hair of scurf and dirt, in fact it washes the hair daily. If, however, the brush is too hard it only irritates the scalp, producing an unhealthy inflammatory state, and consequently the hair suffers.

I know no subject more neglected on the part of parents in rearing their children than the care of their children's teeth, which have to play such an important part in life's history, not only as an ornamental part of the body, but as organs of mastication and articulation. Upon their soundness will often depend the constitution of a child, for without sound teeth the food is not properly prepared for the stomach, and dyspepsia and malassimilation, with their attendant ills, are sure to slowly develop. The value of preventive measures to ward off decay and disease can be properly discussed as *hygiene of the teeth*, and should be insisted upon by every parent. To make this clear, let me inform the reader that all *caries* begins from the *outside*, not from the *inside*, as is erroneously supposed; in fact, I believe I am speaking a scientific fact when I state there is no such thing as internal caries. Hence the importance of keeping the surfaces absolutely clean by attending to hygienic rules.

Parents may ask, '*When ought these rules to be put into force?*' The answer assuredly is:—'As soon as ever the teeth appear.' A tooth-brush according to the size of the child's mouth should be obtained, and used every night charged with precipitated chalk, made pleasant by the addition of some aromatic powder. Of course, as soon as the child is old enough, it should be taught to perform the operation without assistance, but the parent should always see it is properly done. Yet how few children's teeth are so treated, and how rarely the habit of doing it for themselves when they are old enough is taught them. I firmly believe, that if such habits were inculcated, there would be a great immunity from dental trouble, and the amount of benefit to the children when they arrive at manhood or womanhood would be difficult to estimate. While upon this subject, I might mention that I am a great advocate for the toothpick, if carefully used, particularly before cleaning the teeth. They may do harm if abused (like most things), by causing irritation of the gum between the teeth and loosening them by inflammatory action; but if used, as I have said, judiciously, they are of great value in removing accumulations of food and hardened mucus secretions.

If a child is properly clothed and attended to, according to hygienic laws, it is not at all likely to catch *chills*, the after-consequence of which may be detrimental to the child's health, and bring in its wake what is vaguely called a weak chest, which means that the lungs will undergo degenerative change at the slightest provocation. I will mention another effect of a chill, viz., the production of rheumatic fever, which may be acute or only showing itself by slight pain and swelling in different joints. Often this slow, insidious disease leaves its death-mark in the child by permanently affecting the delicate lining membrane of the heart, which slowly gets worse, and perhaps the mischief is only detected when the victim of it is undergoing a medical examination for some position in life. In a changeable climate, like ours, I grant it is nearly impossible to prevent children catching cold, but I must also add that about 50 .per cent of infantile diseases, due to cold, are preventable by attending to hygienic laws, as I have been endeavouring to make clear.

The part of the subject dealing with the early calling in of medical aid, and continuing the treatment until the child is perfectly, cured is not by any means the least important. The farthing wise and pound foolish policy is very applicable in regard to medical aid. People wait day after day, thinking a child will get better, and do not send for their medical practitioner until the disease has taken a firm hold of its victim, and then find fault with the doctor if the case does not progress as rapidly as they would wish. A mother should every night carefully inquire into the health of her children, and should she discover any feverishness or other signs of ill-health, a purging dose, according to the age of the child, of fluid magnesia may be administered, and half a pint of hot milk given before going to bed. If no improvement in the symptoms take place by the morning, the medical attendant ought to be summoned. Perhaps I should not speak in favour of my own profession, but I will say that I think doctors generally show much sympathy towards children, and take great pains with them, more particularly when parents put confidence in them, for they are generally fathers themselves, and know only too well the fragileness of early human life.

When writing on the subject of preventable diseases, I stated I trusted parents were not so foolish in the present day to imagine children were better off constitutionally who may have had zymotic diseases.

Every precaution should be taken by wise parents to prevent contagion altogether, for fever constantly leaves dangerous after-symptoms; for example, measles may leave behind chronic inflammation of the nose and ear, which may produce deafness; scarlet fever does frequently leave behind dropsy, kidney and heart disease, besides deafness; diphtheria, paralysis of various muscles. As I have said the preventable diseases can be in most instances kept away by paying strict attention to hygienic laws, and using every ordinary care to prevent infection, and it is the duty of every parent to protect their children accordingly. I will, before leaving the subject, strongly recommend every parent to follow up the rules, as laid down, for carrying out hygienic principles as applied to children, for I feel certain the extra care will bring its own reward in producing robust men and women, who will, in their turn, be able to comfort their parents' declining years.

"Sleep is to the mind what food is to

the body;" we might, however, extend this saying by adding that sleep is food to the body as well. Nature intended sleep as a sort of stop-gap to prevent exhaustion, and too much bodily fatigue; in fact, to enable the muscles to recover themselves by means of rest. If it were not for this wise provision of nature, some people would soon wear themselves away by being continually on the move, unless they were prevented by a feeling of excessive fatigue coming over them, which gradually induces sleep. Again, when the body is deprived of fuel, in the shape of food, and the various organs are not sufficiently nourished, Nature tries to overcome this deficiency by means of sleep, which prevents, in a great measure, further wear and tear of the body.

Sleep is every bit as essential as food to the human economy, more particularly in the case of very young children who require a very large amount of sleep in order to support rapid growth. Children, until they are four years of age, require nearly twelve hours' sleep at night, and about two hours in the middle of the day; after that age the midday sleep may be discontinued.

There are many causes which prevent young children from sleeping properly, and which can generally, by patience, be found out and remedied. Among the most prevalent causes are:—

a. Too heavy a meal before bed-time.

b. The child is either too warm or too cold.

c. A pin or a bristle in the child's night clothes, or in the blanket, producing pricks and pain.

d. Active little insects known as fleas.

e. Worms may cause sleeplessness through irritation.

f. Dentition, particularly in children with very hard gums.

g. Various forms of skin eruptions which cause frequent itching when the child gets warm.

h. Many infantile diseases.

I need hardly say that nearly every one of these causes can be cured by proper treatment, and it is nothing else but cruelty for a mother to hear her child constantly crying and waking up at all hours of the night without endeavouring to ascertain the cause. When children are carefully fed and reared they never wake up from the time they go to sleep until daylight falls upon their eyes. The sleep is sound and peaceful, and when they awake they are thoroughly refreshed and appear full of life, electricity, and spirits.

Parents should always discourage the desire of young children to sit up late, because it is a habit that gradually grows upon them, and if they are allowed to do so often, they soon begin to think they have a right to do as their elders do.

It is false kindness altogether, for it only causes excitability of the brain which militates against sleep. The child so treated is nearly sure to have a bad night, disturbed by dreadful dreams. I know of no place where the want of sleep is more detrimental to young people than at boarding schools, where the dietary is not sufficient and the mental work excessive. The scholars, however, think it good fun to talk or read to an advanced hour of the night. I remember at a school I was at, we used to patiently wait until the head master had gone to bed, which he did regularly at eleven o'clock, then out came our private candles, which were duly lighted, and we read "Dick's Adventures in the Lands of Horrors," or some such blood-curdling tale, until about half-past twelve or one o'clock. Nice food for a tired brain to sleep upon. The result was that, at half-past six in the morning, we were more fit to go to bed again than dive into the adventures of Cicero by translation. The only way to prevent boys doing, such things is to study more carefully their wants in the way of enjoyment and recreation, by allowing them plenty of time for that purpose, and by selecting interesting stories for them to read, as well as history and travels, etc. The old Latin proverb, *quantum sufficit*, would come in here, and the boys when they went to bed would go to sleep. I have not the least doubt but that a similar state of affairs exists in many girls' schools; at least a confession was made to me by one young lady, who stated that she used to read for hours after she was supposed to be asleep. We cannot blame these young people, for they are light and gay and bear no thought for to-morrow, it is their teachers and parents who are to blame, for they, being taught by the experience of years, should be always inculcating into the ears of the young the injury of such practices to their health, at the same time offering additional attractions in the opposite direction, which are likely to prevent the practices referred to.

If sleep is as needful to the body as food, it necessarily follows that some injury to the health is sure to take place when the body is deprived of it, no matter what the cause may be. We should in every way try to let children have the required amount of sleep. I know of no better plan to accomplish this than by devoting the hour before retiring to bed to play and frolic. Amusement produces joy and contentment of the brain, while at the same time it also brings about a healthy fatigued feeling, and the child is only too glad to close his eyes as soon as he is comfortably ensconced in bed.

The more frequent cause of sleeplessness among children of all ages is, without doubt, improper feeding. Children when fed on food not suitable, in a digestive sense, to their requirements frequently suffer from indigestion, which produces considerable irritation in the alimentary tract, producing a reflex and disturbed condition of the brain. This particularly is the case with young infants when fed upon starchy and farinaceous foods, for these foods are not acted upon by the saliva on account of the proper ferment not being developed, hence they pass into the intestines as undigested hard lumps, causing spasms. Older children are often given cake and other improper food just before they go to bed, which produces similar symptoms and consequences.

The next most frequent cause is dentition. When the temporary or milk teeth begin to pierce their way through the hardened gum they cause a certain amount of pain and irritation. This is particularly the case with boys with very hard gums, which by constant pressure of the teeth soon become inflamed, causing a continued lancing, stabbing pain.

No wonder the child cannot sleep under such painful conditions, and the only way it has of calling attention to its sufferings is by keeping up a continued noise by crying until something is done to relieve the pain. I have constantly seen this relief brought at once by the aid of a sharp lancet quickly drawn across the hardened gum and the flow of blood increased by some warm water. The child has shortly afterwards dropped into a sound sleep and enjoyed that rest so needful after many wakeful nights. It would be out of place here to go more fully into the question of treatment during dentition, so I will merely advise mothers to consult the family doctor when they believe that dentition is the cause of the child continually crying.

In concluding, I would like to impress upon mothers that it is quite impossible for children to enjoy robust health unless a proper number of hours' undisturbed sleep is enjoyed nightly. It is frequently the sole reason of a child being sickly and delicate who, from the care and attention bestowed upon him, should be strong and healthy.

CHAPTER XI.

CLOTHING.

The subject of clothing plays a very prominent part in the science of hygiene, but the ornamental side of dress, guided by the dictates of fashion, has taken such a strong hold upon the general popular mind that the hygienic side of the question is scarcely ever considered, unless, perhaps, nature has suddenly stepped in with an attack of rheumatism, when greater care is taken—at least in the selection of under garments. Man's clothing changes so little, and is usually made of wool (perhaps in the present day it would be more correct to say *shoddy*), that in writing a chapter on clothing we may, for all practical purposes, leave him out, and apply our remarks almost entirely to the gentler sex.

From a physiological point of view, the sole object in wearing clothes is to protect the human skin. I am afraid, however, that very few look upon dress in that light, but rather dress to look nice. How few people are taught that the skin is a most important and complicated physiological organ, and has so much to do in preserving the health of the body, and that if the several functions it possesses are interfered with through ignorance or carelessness, the health is sure to suffer.

It will not, I think, be out of place here to mention that the skin consists of two layers, the outer one of which is called the *epidermis*, and is composed of small round cells, which multiply very quickly, and are worn away by washing and the friction of clothing, and the other, which is beneath the *epidermis*, is the true skin. Interspersed in these two layers are different secreting glands, fine blood-vessels, and nerves, which perform six distinct functions, viz.:—

a. Protective.
b. Sensitive.
c. Excretive.
d. Secretive.
e. Regulate the temperature of the body.
f. Assist the lungs in the process of respiration.

There is no necessity to define the first two functions, for we have only to cut ourselves to be furnished with a practical illustration of the particular use of the first, and a spider need only crawl over us to illustrate the second. The third function, *excretion*, is constantly going on in the form of perspiration which aids the lungs, kidneys, liver, and bowels to remove the waste matter of the body. *Secretion* is from the sebaceous glands and provides a certain amount of oil to lubricate the skin, and is particularly useful in protecting and promoting the growth of the hair.

The function of the skin in regulating the heat of the body is performed by the network of blood-vessels called *capillaries*, which dilate when the temperature of the body is above normal, with the result that more blood rushes to the skin and perspiration takes place; and contract when the temperature is below normal, and thus prevent the blood from coming to the surface and becoming chilled.

The last function I have mentioned, viz., *respiration,* is performed by the substitution of *oxygen* for *carbonic acid.* Nothing better shows the great assistance this function is to the lungs than the case of a child being badly scalded by boiling water, and the greater part of the function of the skin destroyed, when the lungs may, and very frequently become, dangerously congested through having too much work put upon them by reason of such injury to the respiratory function. A very simple and easy demonstration of *respiration* is to place your hand near a looking-glass, the surface of which will soon become dim.

These important functions carried on by the skin have only to be carefully thought over for even the most frivolous persons to comprehend, that they must not consider the skin as a mere ornamental covering, and its only use to look nice, and that it behoves them to bestow attention not only on the face, arms, hands, and neck, but to exercise the same amount of care in respect of every part of the body; in fact, only by keeping the skin healthy and properly clothed, what we call a *good complexion* is given to the face, etc.

Our principal object in wearing clothes in a temperate climate, is to maintain the heat of the body and keep it in a hygienic condition. Clöthes perform this duty by regulating—

a. Radiation,
b. Conduction,
c. Prevention of evaporation from the skin.

To avoid any possible misunderstanding, I should perhaps say that clothes to properly perform the duties I have just mentioned, should be made of wool; for animal wool is a *non-conductor* of heat, and being porous, absorbs moisture from the skin by allowing it to pass through its fibres in a somewhat similar manner to water running off a bird's feathers. I think if we only put our common-sense to its proper use, viz., the purpose of thinking out our everyday problems, we cannot avoid seeing that animal wool is the most sanitary and rational clothing for the body. Nature herself furnishes a very striking example of this, as we find all animals (particularly those in cold climates) are clothed either in what we commonly call wool, or in another form of it in the shape of hair. If we look further into the subject, we shall find that wool and hair are actually part of the skin of the animal, and grow from the *keratin* or protecting epidermis of the skin.

Woollen clothing, or rather, clothing manufactured from *animal wool*, acts as a second skin, and has most of its advantages. This is not the case with vegetable wool, linen, or cotton, for these are very *good conductors* of heat, and being but slightly porous, absorb and retain moisture even to the extent of making the surface damp. Notwithstanding this, nine out of every twelve people wear linen next to their skin, and having regard to what I have just stated as to linen and cotton, can we be surprised that colds, bronchitis, rheumatism, neuralgia, and skin diseases are so common? Great errors always possess great vitality, and this, I presume, accounts for the fact that people having adopted the custom of making underclothing of fine linen, will not change that custom, although the pens of many eminent men and women have for so many years been pointing out the injury to health resulting from such a custom. In the case of wet linen or cotton garments, what happens? The ventilating power is diminished, and the conducting power much increased, the garment then becomes air-tight, feels cold and chilly, clings to the person, and continues to suck the heat out of the body; on the other hand, if the garments are made of wool they always feel warm even when damp, and the skin does not get chilly.

I am thoroughly of the opinion that clothing to be hygienic should be made of wool, and the body, at all events, have a covering of this material from head to foot. The material of the other garments is not of so much consequence, although it would be very much better if wool entered into their composition. I have constantly seen most agreeable results in patients following my advice, and having their night as well as day apparel made of wool, when suffering from indigestion, rheumatism, or weak chests. I consider that it is even more important to have the night garment composed of wool than the day garment, for at night the body comes in contact with cold linen in the shape of sheets; but these are not of so much consequence if our skin is well protected by a woollen covering. Strictly speaking, it would be far more hygienic to dispense with sheets altogether and sleep next the blankets.

The name of Dr. Jaeger has long been

associated with a pure sanitary woollen system, and he claims for the underwear devised by him that it is made from:

a. Pure, unadulterated, undyed, and unbleached animal wool.

b. Being made of porous stockinet web, it permits the exhalation of the skin to readily escape, but prevents ingress of draught.

c. It maintains the skin at an equable temperature, being a slow conductor of heat.

I have carefully examined some specimens of the material of which the underwear is made, from one of the depôts that sells Dr. Jaeger's goods; and from a very careful chemical and practical examination of the material, I believe that all the above points claimed for the goods are in accordance with the results of the examination. Mothers can provide themselves with Jaeger's woollen materials and make the clothes at home. The three garments I consider so beneficial for children of all ages, after they are five years of age, is a combination underwear, a kind of pyjama suit for both boys and girls, made with such variations as may suggest themselves to the maker: and a night-gown made straight with a high neck and long sleeves, for babies. Children kick about so in bed that they frequently get themselves uncovered and exposed to cold draughts of air, that it is most necessary they should be provided with a sleeping garment which permits full freedom of movement, and made very light, but at the same time warm, without the child being able to kick it off, whatever its movements may be. I have a little patient now that frequently had rheumatic attacks until I prescribed a pyjama night-dress made of Dr. Jaeger's pure, porous wool.

There can be no doubt that the topic we are discussing is of especial interest to fathers and mothers as affording them so much enlightenment on a matter of vital importance, viz., the clothing of young children, and too much stress cannot be laid on the real necessity for acquiring such a knowledge. I sincerely trust that the school which advocated exposure to cold air, and the use of cold water, for the process of *hardening* young children, has long since been convinced that its theory is not only wrong, but horribly cruel. The skin of the young is very fully supplied with blood-vessels, tender and delicate, so that any sudden exposure to cold is injurious, and even dangerous; and, as a warning to parents, I may mention that many fatal cases of bronchitis and pneumonia have been the results of insufficient and improper clothing.

In conclusion, I would add that the subject of clothing should be of interest to every mother on account of the great liability of children to diseases of the chest, and other forms of cold. Taking then into consideration the numerous advantages of woollen clothing and its economy, I would suggest that every garment be made of pure wool. The thickness and number of garments may, however, be changed, according to the season of the year, being made of a stiff woollen material in winter, and a lighter one in the summer season.

BRITISH MEDICAL A

CHAPTER XII.

SCHOOL HYGIENE.

The hygiene of schools is so important a subject, particularly to parents, that I think it worth while to devote an chapter to it. It would, however, be superfluous for me to enunciate and explain the principles of hygiene with regard to air, water, drainage, ventilation, warming, lighting, and building, and prevention of infectious diseases, because all have had special attention devoted to them in the different chapters on these subjects. I need not put particular emphasis on the fact, that more attention should be devoted to these hygienic principles in the case of schools than in private houses, because a large number of young persons of both sexes spend the greater part of their lives in these establishments at that very important period of life when Nature is forming the man or woman, either for better or worse, with regard to physical or mental growth. Seeds of morbid states grow slowly, incipiently, even in strong and healthy children, when living daily for hours in insanitary schools, with the frequent and appalling consequence that instead of being ready and fit and strong to battle with life on leaving school, their health is already undermined, consumption or some other malignant disease quickly develops, and they die off just in the prime of life. Parents should, therefore, really attend more to this subject; it is their bounden duty not to trust to the mere word of anyone, but to insist upon having a sanitary certificate which includes a satisfactory report on all the necessary subjects, duly signed by a practical physician well versed in sanitary science and dietetics. Such a report is essential, for a parent armed with such a document could sue in the High Court for damages if the matter set forth was not correct. Unscrupulous masters and mistresses would think twice before running risk of prosecution if their schools were in unhygienic condition, and conscientious heads of such establishments would be only too glad to have everything done that science can suggest to maintain the health of the young persons placed under their care, and would be only too willing to furnish a report, although it might cost a few guineas per year to do so efficiently.

I have known parents place their sons and daughters, when of a tender age, in most expensive establishments in the country without having seen the place, or having any security as to its hygienic conditions, the correspondence being concerning the instruction given and class of pupils taken, and who have been horror-struck to receive a telegram after a few months of residence, that their child has diphtheria; or when the children arrrive home for the holidays, instead of rosy fat cheeks that fresh country air should provide, to see white thin lantern-jawed faces, bad appetites, and all the symptoms of some bad sanitary arrangements or dietetic deficiency.

The subjects I intend to carefully go over in this chapter are,

a. Time devoted to study.
b. Seats.
c. Desks.
d. Athletics.
e. Eyesight.
f. Punishment.
g. Discipline.

The subject of dietary I must omit altogether as being far too long for the intention of this chapter. I must refer the reader to my work on "Food and Drink Rationally Discussed"[1] for information on the subject, which should be bracketed with hygiene in importance.

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[1] Published by Mr. Henry Kimpton, 82, High Holborn, W.C.

OVER-PRESSURE.

Misdirected and excessive mental work or over-pressure has *of late* been forcibly discussed in this country, in Germany, and America, and the conclusion come to by all scientific and right-minded men and women is, that it is wrong in principle and injurious in practice, and that instead of producing clever, intellectual, gifted men and women, it only produces *psychological specimens* of mental overwork. Healthy-minded children have a natural gift for observation and speaking different tongues, reciting poetry, and picking up music, but when it comes to hard dogmatic teaching, as for instance of grammar, arithmetic, etc., they often show great stupidity in learning it. A very little of this kind of learning should be forced upon children of a tender age, a faculty for such studies being slowly developed. Well-fed children of intellectual parents surrounded by every hygienic contrivance for health can study for six hours a day—three hours and a half in the morning, and two hours and a half in the afternoon after a light lunch—without injury to health. Home lessons should not be begun before twelve years of age, and then a couple of hours is sufficient. Evening work doubtless excites the brain, and makes them wakeful and liable to headaches and malnutrition. The higher education of both boys and girls, which in the present day is carried on under excessive pressure of competition, is fraught with so much danger to their health and capacity for work, that it is a serious question whether we are not sowing seeds for a large crop of idiots and lunatics in future generations. Mothers of a race, in particular, should be physically strong not only in body but in mind, and woe be to their offspring if overpressure has left its mark on that delicate substance *brain-matter*. Men and women of a mature age can look after themselves. Children cannot, and it is the duty of parents to bring up their children so that when they reach an age when they can think for themselves their bodies and brains are in a healthy condition and properly trained for them to do so sensibly.

SEATS AND DESKS

have their bearings on the growth, eyesight, and health of children. It does not require much intelligence to understand that a child stooping over a desk for some hours a day at that period of life when growth is rapidly going on, that spinal curvature, round shoulders, and faulty digestions will be the result. When children are writing they should sit upright at the desk, and when reading they should sit on a seat with a back to it, so as to support the spine, and not rest their book on the desk. The desk or the seat ought to be movable at pleasure, in order that they may be made suitable for children of various ages and height; the seats ought to have backs to them, and it is far better for each scholar to be provided with a separate desk. The light, natural or artificial, should be *carefully* distributed that every scholar may see *without straining the eyes.*

ATHLETICS OF ALL KINDS

are most useful additions to mental work; they not only build up the muscles, expand the chest, promote nutrition and warmth, but are exhilarating to the mind and spirits, refreshing the whole system. Unfortunately at the present day, football, lawn tennis, cricket, rowing, swimming, and gymnastics are carried to excess, and the emulation process is so strongly engrafted in the schoolboy and girl, that the weak and delicate are sure to suffer when competition is rife. Those who have charge of young persons should prevent excess in athletics as in learning. The muscles, heart, and lungs can be overworked and fatigued in the same way as the brain.

EYESIGHT

I need not place any emphasis on the great importance good eyesight is to everyone who has to fight the battle of life, and often it is that some valuable appointment is lost through the candidate not being able to pass the medical examination for *sight test.* Constantly the defects of vision can be ascribed to the combined influence of deficient and ill-directed illumination, bad type, and faulty sitting position. A child should be seated at school with ample light, so that no strain is put upon the eye either in reading or writing. If these circumstances are not attended to, and the light is not perfectly diffused, be it daylight or artificial illumination, there is *dulness*, *glare*, *or shadow*, which obliges the child to be continually focussing the eyes, this in time produces short-sightedness (myopia), or weak sight (astenopia), by wearying the muscles of the eyeballs.

Ideal natural illumination is *daylight* let in through a large skylight, ideal artificial is the electric light, so placed as to be concealed from view. If circumstances will not permit these ideal lights, the source whence light is derived should be steady, free from direct glare, and *without flaring or flickering.* The arrangement adopted in billiard-rooms remedies many of the evils of oil and gas light as illuminants, and blinds properly constructed are serviceable to keep out the glare of the sun.

DISCIPLINE

must be maintained in schools, and parents are foolish indeed to listen to the tales of their children whenever they are subjected to slight corporal punishment, administered for not obeying the rules necessary for the welfare of all, which discipline will be of the greatest benefit in after life, when they enter any of the services, or obtain their living by intellectual work. Caning the hand, boxing the ears, and hitting the head are certainly objectionable, but there are regions of the body where punishment can be administered with safety. Keeping the pupils in the school-room, or by themselves in cold bedrooms, without much food is very reprehensible, but a little extra drill, as recommended by Dr. Alder Smith, conduces to both moral and physical improvement. I was once consulted in a very obstinate case of a young girl who had exhausted the patience of many school-mistresses. I advised that she should have the same food, lessons, and exercise as the other girls, but the mistress should not speak to her, although having her by her side when out for exercise, and at the same time another girl about the same age with whom she should converse in a pleasant manner. In a week she implored the governess to forgive her, and except for a few more outbreaks, was a most exemplary scholar. Discipline and punishment of the young require a thorough knowledge of children, backed up by *patience* and intelligence.

CHAPTER XIII.

VOICE HYGIENE

I HAVE searched in vain among the leading hygienic works for an article on the voice, and venture to predict that all the eminent writers of these works, if questioned on the subject, would thoroughly agree with me that living in an ideal state of hygienic surroundings plays a prominent part in the cultivation and preservation of the voice.

The sound which emanates from the mouth, and which is transformed into harmonious and intelligible sounds, is termed the voice, and is dependent on more than one organ for its production, viz., the diaphragm, lungs, chest-walls, larynx (throat), vocal cords, the nose, mouth, tongue, and teeth. So it stands, to reason if any of these parts are in an unhealthy condition, the voice will suffer.

Most singers, public orators, and those who gain their living by the aid of their voice, are conversant with the above and are most careful to preserve their general health in order that their voice shall be in good condition.

Living by sanitary laws, and thereby keeping up a high standard of health, is better for the voice than all the emollients, astringents, and medicaments so much lauded and praised by quacks, and even intelligent people. I don't think I need place very much stress on the subject, for I am sure it will be at once acknowledged as correct by all thinking readers.

There is no special sense so affected as the voice by the abuse of eating and drinking, deficient warmth, ventilation, and sewer gas, for as I explained, its dependence on other organs keeps it always in sympathy with them. A catarrh or congestion produced by a chill, unhealthy surroundings, or vitiated atmosphere may affect the whole or part of the respiratory tract, or any of the organs named (which are the most delicate in the body), and produce partial or total loss of voice.

The diaphragm and chest-walls must be healthy to contract on the lung, and bring about expiration after they have been filled with air by inspiration. The air so retained has been called *complemental, reserve, and residual*, which the educated singer or speaker knows how to manipulate and control as it passes through the vocal cords, producing various harmonious sounds which are further developed in the cavity of the mouth with the aid of the tongue and teeth, none of which sounds can be produced to perfection should any of the parts be affected by disease however slight.

I would say about the voice "*it hath charms to soothe the savage breast*" what somebody said about music. Nothing is so fascinating in man or woman than a clear harmonious voice, it does away with many other imperfections. The physician or nurse with a sweet voice soothes pain, and comforts the patient, a preacher draws and enthrals his congregation, the public orator charms and even changes men's opinions, while to a woman it is a boundless treasure.

I think as a nation we are to be congratulated on the musical sound of our voices. Doubtless Nature has something to do with this fact, but custom and habit more. For compare the voice of a child brought up among cultivated people with one brought up in a coster's family, therefore cultivation plays an important part; hence the difference between an operatic singer and an ordinary being when speaking, in the former there is a clear ring which falls on the ears as soft music.

People should preserve their voices when young by living according to sanitary laws, always taking care never to unduly strain it by shouting or singing high notes, but lay the foundation by cultivating low or chest notes, which in time will bring forth a beautiful voice. The whole voice is strengthened by low notes, whereas high notes often unduly strain and injure it, this accounts for soprano voices not lasting so long as contraltos. A person who has a good strong healthy voice, and who ignores the higher notes, will find that when the time comes for them to be used, they roll out without any great effort, provided he has command of his *reserve air*.

Chest-notes give intensity, power, and flexibility to the voice, and also in some, after prolonged cultivation, a beautiful timbre. They can be felt by placing the hands upon the chest-wall, when a sensation of rebounding is felt. I would hardly go so far as to say that every man and woman by cultivation of the voice could become an *artiste*, but I believe by judicious cultivation everyone can possess a musical voice for artistic speaking and singing which would indeed make our journey through life more pleasant.

Begin by paying great attention to the quantity and distribution of air inspired or expired, what is commonly called *breath*. Take as long breath as possible, and eke it out by degrees, not wasting any practice on all the vowels. Afterwards read both prose and verse aloud, and parts of Shakespeare, the immortal guide to elocution. Notwithstanding what I have written concerning the benefits of hygiene in voice preservation, there may be natural and temporary defects of the voice that require, in addition, astringents, inhalation, or emollients, but these should only be used carefully, and only under medical advice, until the parts are healthy again.

In order to keep the voice healthy, nothing more is required than avoidance of chills, plenty of fresh pure air, good nourishing simple diet, and plenty of outdoor exercise. I maintain this, although I am told nearly every celebrated singer, actress, and actor has a pet remedy to maintain the tone of the voice. Perhaps in the vitiated atmosphere they have to perform in, such a belief is quite excusable, and may benefit exhausted and fatigued nature.

CHAPTER XIV.

SOME NATURAL CONDITIONS AFFECTING HEALTH.

For the purpose of convenience we may discuss these under the following heads:—

a. Geological.
b. Topographical.
c. Water Supply.
d. Climate.

The geology of a town has of recent years been made the subject of special study, and is of great interest to local authorities who wish either to improve the sanitary condition and water supply of a place, or erect public buildings such as schools, hospitals, and convalescent homes, all of which buildings are, directly or indirectly, of the utmost interest to every householder. In the chapter on architecture I have mentioned how important it was when selecting a site for building purposes to look most particularly to the composition of the soil, and in addition to this we may, with advantage, study the geology of the district.

Stiff clay soils are known to be cold and damp from the accumulation of water on the surface, the greater part of which is evaporated. The contrary applies to gravel, sand, and chalk, for these absorb most of the rainfall, and as they have but little moisture for evaporation they are drier and much warmer than a clay soil.

In choosing a site for a dwelling, the above must be taken into consideration, as well as the obvious one of the *aspect*, including exposure to the sun and wind. It is better to have the sun in succession on each side of the house in order that the outer walls may be kept dry, thus keeping the house warm in the winter and cool in summer by aiding ventilation. With regard to the winds; the sleeping apartments and chimney-stacks should face the *South*, and the larders, lavatories, and library the *North* or *North East*. Sites in hollows, valleys, and places surrounded by thick trees should carefully be avoided for dwelling places.

I may, perhaps, mention here that the particular nature of the subsoil and inefficient drainage will often induce such diseases as *phthisis*, *ague*, *cancer*, *rheumatism*, or *goitre*, and this has been frequently demonstrated in various parts of England where, before the districts were thoroughly drained, *ague*, *rheumatism*, and *goitre* were always endemic. Mr. Haviland has drawn a very clever map showing the geographical distribution of disease.

The topographical condition relates to the situation of the various parts of a town or district, whether the same are low-lying, sloping, or elevated. The subject is of some importance, as it is frequently simply on account of topographical differences that any one town or place may possess so many different hygienic characters and degrees of salubrity, and that, in short, we find in the same town one part pretty healthy and another part quite the reverse.

I have gone so fully into the subject of water supply in a previous chapter that there is, I think, no necessity for me to discuss the matter again, and I would therefore refer the reader to such chapter on page 45.

The meteorological condition of a place, which we generally distinguish or know by the term *climate*, is certainly the most important of all natural conditions, and has everything to do with the making of health resorts. This subject I have gone into very fully in the third edition of "*Sea-Sickness — Voyaging for Health — Health Resorts*," just published. The subject is of great interest to people who are constantly suffering from ill-health, and to parents who have the bringing up of a family, for the fact cannot be disputed that the first twenty years of our lives have a great deal to do with our constitution in rendering it robust, and thus enabling it to withstand the wear and tear of after life, of which we must all have our share. Then again, the majority of families have some hereditary taint in their system, which, if the children were brought up on a different soil, or in a different climate, might remain latent for years, and perhaps altogether. I can give a very good illustration of this from my own experience. I was called in consultation over a case of consumption, where there was a very plain hereditary family history of the disease, and one of the children had already died from the disease. I went very carefully into all the circumstances of the case, and was struck with the fact that those members of the family who had been for the greater part of their lives away from the district never contracted the disease, while on the other hand, those who resided in or married some one in the place, were affected. I advised that the whole family should leave the place, but this they would not do, as they and their ancestors had lived there for about a hundred and fifty years. The children, however, were sent away, with the result that the child attacked gradually threw off the disease, and none of the other children contracted it. The house was very insanitary and badly ventilated, and the climate damp and sedative; in fact, just the place for *bacilli* to find a suitable *nidus* to become productive in. A family with an hereditary taint should always consult their medical attendant or a physician, as to whether the climate, or nature of the soil, of the place in which they are living is at all favourable to the disease to which they are susceptible.

The study of meteorology is an attractive, interesting, and simple study, and the surprise is that more people do not take it up. We learn from it much information concerning the conditions of any district, of which the following are the most important:

a. Daily temperature.
b. Amount of rainfall.
c. The force and direction of winds.
d. The barometric pressure.
e. The degree of humidity.
f. The composition of the air and amount of ozone in it.

A certain number of instruments, of course, will be required to carry out these observations, but they can be obtained at any nautical instrument maker in London or in most large towns.

The radiating power of the sun is measured by an instrument called a thermometer which may either contain mercury or spirit. The former is better for the sun's rays, and the latter for recording terrestrial temperatures. We often look at a barometer as a weather-glass, but in reality it is only an instrument for weighing the air. Warm air is lighter than cold, and watery vapour is lighter than air, the barometer, therefore, falls with warm moist westerly winds, and rises with cold dry easterly ones, and not from its power of predicting rain or fine weather. Hygrometers are useful instruments for measuring the degree of humidity of the air.

The following are the natural and pleasant points of temperature, etc.:

Temperature:	70° to 75° Summer, 45° to 55° Winter.
Rainfall . . .	25 inches annually.
Humidity . .	60 to 70 per cent at 50° to 65°.
Wind (force)	20 miles an hour.

Meteorological observations are now recorded weekly by the sanitary authority, and so if one does not wish to become an amateur meteorologist, one can generally be supplied with information through the annual report of the medical officer of health. From this report can also be learnt the annual death-rate of the district, and the causes of such deaths. It will be found that there is a very great difference in the death-rates of the various towns in England, and this difference can only be accounted for as being due to natural conditions affecting health, or to some defective sanitation or water supply. The reader will observe from the following statistics how greatly these death-rates vary. Percentage to a thousand:—

Dublin	27.1	Edinburgh	19.1
Manchester	26.4	London	18.7
Plymouth	22.3	Portsmouth	18.8
Newcastle	21.4	Brighton	16.3
Sheffield	21.4		

People rightly have great faith in sea air, and to most people, more particularly children, it is very beneficial and curative, particularly in cases of scrofula, tuberculosis, debility, and some forms of dyspepsia; but there are some people who are never well when living at the sea-side. I have frequently found that these are people either troubled with liver complaints, or suffering from that form of dyspepsia which is caused by a sluggish liver. I find that mountain air, clear and dry, suits them much better.

It would be beyond the scope of the present chapter to go more fully into this important subject of the effect of climate upon disease, but I trust that the preceding remarks will be of some slight service to the reader, and doubtless the subject will, at no very remote date, receive greater attention from our leading scientists than it does at the present time. We often find that by taking a change of air wonders are worked in an incredibly short time. A difference, however, in the purity of the air cannot alone work the miraculous cures; it helps, no doubt, to effect them, but perfect rest, freedom from worry and bother, interesting surroundings, spending the greater part of the day in the open air, sound sleep, and good appetite, are all greatly instrumental in aiding and accelerating the cure. I thoroughly believe in rest as a curative agent, and to obtain it one has often to go beyond the reach of the telegraph wire. I have plainly stated this in my work on "Voyaging for Health," a quotation from which I may perhaps be excused in making, as it so fully expresses my views on the subject: "The sea, too, "with its abundance of ozone, makes it "*par excellence* the most valuable of tonics, "and a restorative which invalids, etc., "may fearlessly indulge in from sunrise "to sunset, breathing as they do all the "time pure fresh air, and air in constant "motion impregnated with salts of sodium, "bromine, and iodine, etc., all of which "are beneficial to the digestive system. "Continuous rest too is a splendid restorative; no post or telegrams to bring bad "news and depress the spirits, no business "or family troubles, but one long day of "peace, with plenty to amuse one, and "generally brilliant sunshine (the universal "tonic of animal and vegetable life) without "clouds."

CONCLUSION.

The reader who has carefully perused the chapters on domestic hygiene will, I feel sure, be impressed with the necessity of following strictly the rules laid down if he wishes to have good health throughout life, and will also have seen how impossible it is to neglect these laws without paying the penalty. I have often made reference to the horticulturist in order to illustrate what can be done in the vegetable kingdom by patience, science, and perseverance, and that if the work is carried out according to hygienic laws, the results are wonderful. I cannot understand why people do not more readily see that under the same conditions, and if reared on the same principles, a similar improvement would most surely take place in the human race. As a most notable example of the success attending properly and scientifically applied horticultural efforts, I would ask the reader to carefully examine the beauties of the 'chrysanthemum, a flower which a few years ago was but a poor miserable plant hardly worth passing notice. Now it can hold its own, even when compared with the rose, admittedly the queen of flowers. In discussing the almost magical advance that horticulture has made in the last decade, I quite admit that the gardener has had to carefully select his plants, in order to bring forth a higher standard of excellence, but all the selections in the world would not be of the slightest use if he had not studied hygienic laws and vegetable dietetics, and applied them to the growth of the plants.

Through attending the various shows of cattle, dogs, cats, birds, etc., I have learnt many useful lessons concerning the great improvements in the various species which are produced by careful attention to the breeding, food, and sanitation, and also what beauty can be developed by reason of the skin, hair, etc., being healthy, vigorous, and glossy. Had no such care been bestowed on the animals, we should find their skin possessing no beauty, but rough, shaggy, and dull.

The following personal experience may be of some slight interest to my readers, to whom I would commend the moral to be deduced therefrom. Some few years ago I paid a visit to a man in the country for the purpose of seeing some prize-bred fox-terriers. The cottage the man lived in was about the most unsanitary, dirty place you could possibly have found in the country. His children, of whom there were about half a dozen, were the most sickly, weak, debilitated little wretches you could see outside the precincts of a dockside slum. I was shown into the garden, and there, in a perfectly ventilated shed, scrupulously clean, was the dog breeder, caressing a number of handsome fox-terriers.

I asked him the secret of rearing such beautiful pups, and he replied: "Well, "you see, Sir, you must first of all look "after the father and mother, get the right "'uns, give them plenty of wholesome, "clean victuals, never let them eat any-"thing out of doors, be particular that "they have plenty of clean water, wash "them frequently, see the place you keep "them in has plenty of fresh air, and then "you will be sure to get healthy pups. "Dogs be very delicate animals and want "lots of care, I can tell you, Sir."

Now here was a man applying all the rudiments of sound hygiene to the rearing of his dogs, and yet bringing up his children without bestowing a single thought upon their diet or the sanitation of his house. I remonstrated with him about it, but could not get much out of him, except *"it don't pay."* What numerous examples of the same ignorance or prejudice I could quote, particularly among farmers and horse breeders, who devote any amount of attention to the study of rearing stock and keeping them healthy, yet never for a moment think of studying sanitary science for the benefit of their household, looking upon it as one of the fads of the modern doctor.

We have undoubtedly, of recent years, made rapid strides in hygienic science, and people are getting to understand that to live healthily they must know something about the Laws concerning public health. There is, however, very much more to be learnt and—which is of more importance to everyone—*to be done*, by the health authorities and ourselves. How often deficiencies are only found out when some fearful epidemic is at our doors. Then there is a great deal of talk, much chaos and confusion, but very little really done at the time, although the panic bears fruit afterwards, and centres of pestilence are brought to light and swept away.

The *late panic* concerning the invasion of cholera fully illustrates my meaning. I consider we are very badly prepared to meet an epidemic of the kind, and it would play havoc among the poor in many crowded districts. The precautions taken to prevent the entrance of the disease, would, were it not for the very serious nature of the subject, furnish ample materials for a good joke in *Punch*. I believe there are only *two* medical officers to inspect all the ships which come into the Port of London. These sanitary officers may be endowed with the strength of Hercules and the learning of Hippocrates, but they cannot possibly cope with the work of properly examining all the human beings coming from infected ports. The whole thing must be a farce. If the Local Government Board would give the learned Medical Officer for the port of London a dozen fully qualified sanitary medical men as assistants, the work could be done well and effectually, and the principal officer could devote his time to the many important questions bearing upon the subject of how to prevent the germs from planting themselves on our shores.

This seems the usual method of procedure on the part of the authorities. They send an army of a few hundred men to conquer an enemy with one hundred times the number, and appoint one extra medical man to stop the inroad of a terrible pestilence. Prevention is always better than cure, and I have always gone on this principle when writing the various chapters on domestic hygiene, and cholera is a typical example of a disease that can be prevented by adopting hygienic laws.

Dr. Ernest Hart, the learned editor of the *British Medical Journal*, gave a splendid definition of cholera, when lecturing before the *National Health Society*, viz.: 'Asiatic cholera was,' he said, 'a filth disease which was carried by dirty people to dirty places,' he further ridiculed the idea that cholera travels by air waves or blasts, and plainly told his audience that "*we eat cholera, drink cholera, but do not catch it.*" People, therefore, who put my chapters into practice need not fear cholera. I might quote in proof of this statement that in the epidemic of 1866 out of 100 medical officers and nurses, who attended patients all through the height of the epidemic, only five nurses were attacked, and four of these lived outside the hospital, and probably did not have such complete sanitary surroundings and careful dietary as were provided for those inside the hospital.

These nurses wore long aprons reaching from the chin to the feet, and caps, which they left off on going to meals, and further, they always washed their hands in a disinfectant solution. All the water they drank was boiled and filtered, all milk boiled, and all bread sterilised. The dietary was very nutritious and plentiful, and every nurse was allowed a certain amount of port wine daily. The whole of the drainage was disinfected daily, and separate offices set apart for all persons employed in the hospital. With such regulations, faithfully and fully carried out, people need not dread cholera more than any other filth disease, and much less such a disease as influenza. I may say that the whole tenet to learn and practise in domestic hygiene can be expressed in the following words:—'*Cleanliness is next to Godliness.*'

In conclusion, I would impress upon the reader that it is a duty to impart a knowledge of domestic hygiene to those who are not placed in so fortunate a position in life as to be educated up to the present standard of sanitary science, which is of benefit to the whole community. I have always found it very easy to instruct this class if you use plain, simple language, and demonstrate everything by some example, such as a comparison to animals, flowers, etc. The working classes will undoubtedly take an interest in the subject when it is shown to be for their good and prosperity.

FINIS.

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